Invitation to Bid

City of Canton, Ohio

Purchasing Department
218 Cleveland Ave. SW, 4th floor
Canton, Ohio 44702

Collection Systems Service Center Garage Addition and Administration Offices Renovation

Item/Project

Collection Systems Department

Responsible Department

2:00:00 PM, 4/6/2022

Bids Due

Bid Proposal Submitted By:

Company Name

Street Address

City **State** **Zip**

Contact Person **Phone No.** **Email Address**

Table of Contents and Bidder's Checklist - Collection Systems Service Center Garage Addition and Administration Offices Renovation

Bidder's Checklist: The completed Bid Form shall be accompanied by the following completed documents:

_____ **Pre-Bid Substitution, if any proposed substitutes have been pre-approved.**
_____ **Bid Guaranty and, if applicable Contract Bond**
_____ **Contractor's Qualification Statement**
_____ **Contractor's List of Subcontracted Work Categories**
_____ **A list identifying its DBE subcontractors and participation rates as a percentage of the Contract Price, and if the DBE participation goal has not been met, certification of good faith efforts to meet the DBE participation goal.**
_____ **The Project Labor Agreement (PLA) Letter of Assent (See Appendix A).**
_____ **If this project is funded in whole or part by the Ohio Public Works Commission, then certification of agreement and compliance with certain statements and covenants regarding Bidder's subscription to the State's Equal Employment Opportunity Requirements for State-assisted Construction Contracts.**

The City of Canton

Legal Notice

Sealed bids will be received by the City of Canton (the "City"), as provided in this notice for the Collection Systems Service Center Garage Addition and Administration Offices Renovation Project (the "Project"), Ordinance TBD. Contract documents, which include additional details of the Project, are on file and available from the City of Canton's web site (https://cantonohio.gov/448/Purchasing-Procurement).

Bids shall be enclosed in a sealed envelope addressed to the City of Canton, 218 Cleveland Ave. SW, Purchasing Dept/Fourth Floor, Canton, Ohio 44702 and plainly marked on the outside "Collection Systems Service Center Garage Addition and Administration Offices Renovation PROJECT BID." Bids will be received on or before 2:00 PM, local time, 4/6/2022 and will be opened shortly thereafter.

Questions regarding plans and specifications should be addressed in writing to Purchasing Department, at purchasing@cantonohio.gov.

All bids must include a Bid Guaranty, as described in the Instructions to Bidders. Prevailing wage rates apply. All bidders will be required to comply with the City Contract Compliance Program regarding equal employment opportunity. After submission and opening, no bidder may withdraw its bid within 60 days after the opening; the City reserves the right to waive irregularities, reject any or all bids, and conduct necessary investigations to determine bidder responsibility.

Published in The Repository on March 8 and March 15, 2022

INSTRUCTIONS TO BIDDERS

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A. BIDDER'S PLEDGE AND AGREEMENT

1. Each Bidder acknowledges that this is a public project involving public funds and that the Owner expects and requires that each successful Bidder adhere to the highest ethical and performance standards. Each Bidder by submitting a bid pledges and agrees that (a) it will act at all times with absolute integrity and truthfulness in its dealings with the Owner and the Engineer, (b) it will use its best efforts to cooperate with the Owner and the Engineer and all other Contractors on the Project and at all times will act with professionalism and dignity in its dealings with the Owner, Engineer, and other Contractors, (c) it will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her, and (d) it has read, understands and will comply with the terms of the Contract Documents.

B. EXAMINATION OF CONTRACT DOCUMENTS AND SITE CONDITIONS AND RELIANCE UPON TECHNICAL DATA

1. Each Bidder shall have a competent person carefully and diligently review each part of the Contract Documents, including the Divisions of the Specifications and parts of the Drawings that are not directly applicable to the Work on which the Bidder is submitting its bid. By submitting its bid, each Bidder represents and agrees, based upon its careful and diligent review of the Contract Documents, that it is not aware of any conflicts, inconsistencies, errors, or omissions in the Contract Documents for which it has not notified the Owner in writing at least ten (10) days prior to the bid opening. If there are any such conflicts, inconsistencies, errors, or omissions in the Contract Documents, the Bidder (i) will provide the labor, equipment, or materials of the better quality or greater quantity of Work and/or (ii) will comply with the more stringent requirements. The Bidder will not be entitled to any Change Order, additional compensation, or additional time on account of such conditions for any conflicts, inconsistencies, errors, or omissions that would have been discovered by such careful and diligent review, unless it has given prior written notice to the Owner.

2. Each Bidder shall have a competent person carefully and diligently inspect and examine the entire site and the surrounding area, including all parts of the site applicable to the Work for which it is submitting its bid, including location, condition, and layout of the site and the location of utilities, and carefully correlate the results of the inspection with the requirements of the Contract Documents. The Bidder's bid shall include all costs attributable to site and surrounding area conditions that would have been discovered by such careful and diligent inspection and examination of the site and the surrounding area, and the Bidder shall not be entitled to any Change Order, additional compensation, or additional time on account of such conditions.

3. The Bidder may rely upon the general accuracy of any technical data identified in the Owner-Contractor Agreement (e.g., any soils exploration reports, soil boring logs, site survey, or abatement reports) in preparing its bid, but such technical data are not part of the Contract Documents. Except for the limited reliance described in the preceding sentence, Bidder may not, if awarded a contract for the Work, rely upon or make any Claim against the Owner or Engineer, or any of their agents or employees, with respect to any of the following:

   a. the completeness of such reports and drawings for Bidder's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by the successful Bidder and safety precautions and programs incident thereto; or

   b. any interpretation by the successful Bidder of or conclusion drawn from any technical data or any such other data, interpretations, opinions, or information.

For example, all interpolations and extrapolations of data performed by the Bidder to estimate locations or quantities of subsurface strata are independent factual assumptions, which Owner does not warrant.

4. Each Bidder will be deemed to have actual knowledge of all information provided or discussed at the pre-bid meeting.

C. OWNER & ENGINEER

1. The Owner is:

The City of Canton
218 Cleveland Avenue SW
Canton, OH 44702
Telephone: 330.489.3245
Fax: 330.489.3499

The Owner's Representative is:

James DiMarzio

2. The Design Engineer for the Project is:

Motter & Meadows Architects
600 Market Avenue North
Canton, Ohio 44702

D. PROJECT

1. The Project and Work for the Project consists of all labor, materials, equipment, and services necessary for construction of the project identified as **Collection Systems Service Center Garage Addition and Administration Offices Renovation Project** ("the Project"), all in accordance with the Drawings and Specifications prepared by the Engineer and/or Owner. The Project must be substantially complete by the Date for Substantial Completion set forth in Section Q below.

2. The Mayor **has** determined that a Project Labor Agreement ("PLA") will advance the City's procurement interest in cost, efficiency, and quality while promoting labor-management stability as well as compliance with applicable legal requirements governing safety and health, equal employment opportunity, labor and employment standards, and other related matters. Any such PLA shall be negotiated by the Mayor of the Owner with the East Central Ohio Building and Construction Trades Council and its affiliated local unions, or said Council's successor. The successful Bidder shall comply with and adhere to all of the provisions of any PLA for the Project.

3. A pre-bid conference will be held at **N/A on N/A** at **N/A**.

E. WORK

1. This Project includes **Collection Systems Service Center Garage Addition and Administration Offices Renovation**, and the like as set forth in the Contract Documents.

2. Alternate No. 1 for this Project is **Remove existing gas line and replace with new gas line from meter to generator, due to possible conflict with subgrade elevation at new parking spaces.**.

3. Alternate No. 2 for this Project is **N/A**.

4. Only one contract will be issued by the Owner for constructing the Project, the General Contract, which will cover all scopes of work necessary to construct the Project.

5. The Contractor awarded the General Contract (General Contractor) will be responsible for the performance and coordination of any and all subcontractors and suppliers either directly or indirectly contracted with the General Contractor.

6. Owner will provide Bidders access to the Project site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes, clean up, and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable laws, regulations and Owner's policies relative to excavation and utility locates. Bidders may contact **James DiMarzio,** The City of Canton, at **james.dimarzio@cantonohio.gov** or **330-438-6941** if they have any interest in accessing the Project site, independent of any pre-bid meeting.

F. ESTIMATE OF COST

1. The total estimated construction cost for the Base Bid Work for the Project for which bids are being solicited at this time is **$2,860,000.00.**

   The estimated cost for Alternate 1 - **Remove existing gas line and replace with new gas line from meter to generator, due to possible conflict with subgrade elevation at new parking spaces.** is: **$4,000.00**.

   The estimated cost for Alternate 2 - **N/A** is: **N/A**.

G. CONTRACT DOCUMENTS

The Contract Documents consist of the documents listed in Section 1 of the Owner-Contractor Agreement.

Bidders may view and download copies of the Contract Documents from The City of Canton Purchasing web site at https://cantonohio.gov/448/Purchasing-Procurement, which is the only authorized source of the Contract Documents. The City of Canton's sourcing tool, Vendor Registry, will maintain the Bidder's list and will provide notice and copies of Addenda as issued. It is the responsibility of any person or organization interested in a hard copy of the Contract Documents to pay all costs associated with printing.

Bidders shall use complete sets of Contract Documents in preparing bids. Neither the Owner nor the Design Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Contract Documents.

The Owner, in making the Contract Documents available on the above terms, does so only for the purpose of obtaining bids on the Work and does not confer a license or grant for any other use.

H. PREPARATION OF BIDS

1. All bids must be submitted on the "Bid Form" furnished with the Contract Documents.

2. All blank spaces shall be filled in, in ink or typewritten, in words and figures, and in figures only where no space is provided for words, and signed by the Bidder. The wording on the Bid Form shall be used without change, alteration, or addition. Any change in the wording or omission of specified accompanying documents may cause the bid to be

rejected. If there is an inconsistency or conflict in the Bid, the lowest amount shall control, whether expressed in numbers or words.

3. Bidders shall note receipt of Addenda on the Bid Form. If the Bidder fails to acknowledge receipt of each Addendum, the Bid shall be deemed non-responsive, unless the Bid amount clearly and unambiguously reflects receipt of the Addendum or the Addendum involves only a matter of form and does not materially affect the price, quantity or quality of the Work to be performed.

4. Each Bidder shall submit **an original** of its bid to the Owner. The Bid Form shall be signed with the name typed or printed below the signature. A Bid shall not be submitted by facsimile transmission or any other electronic means. A Bidder that is a corporation shall sign its bid with the legal name of the corporation followed by the name of the state of incorporation and the legal signature of an officer authorized to bind the corporation to a contract.

5. Each Bid shall be enclosed in a sealed opaque envelope with the Bidder's name and the title of the Project printed in the upper left hand corner and addressed as follows:

   The City of Canton
   ATTN: Purchasing/Bids
   218 Cleveland Avenue SW
   Canton, OH 44702

   Bids must be received at the designated location for the bid opening before 2:00:00 PM, local time, on 4/6/2022.

6. The completed Bid Form shall be accompanied by the following completed documents:

   a. Pre-Bid Substitution, if any proposed substitutes have been pre-approved. (See Section K, below.)

   b. Bid Guaranty and, if applicable Contract Bond (See Paragraph H.8, below.)

   c. Contractor's Qualification Statement (See Paragraph I.4, below.)

   d. Contractor's List of Subcontracted Work Categories (See Paragraph I.5, below.)

   e. A list identifying its DBE subcontractors and participation rates as a percentage of the Contract Price, and if the DBE participation goal has not been met, certification of good faith efforts to meet the DBE participation goal. (See Section W, below.)

   f. The Project Labor Agreement (PLA) Letter of Assent (See Appendix A).

   g. If this project is funded in whole or part by the Ohio Public Works Commission, then certification of agreement and compliance with certain statements and covenants regarding Bidder's subscription to the State's Equal Employment Opportunity Requirements for State-assisted Construction Contracts (See Section Y, below.)

7. The Bidder shall take the following precautions in preparing its bid:

   a. Sign the bid and check to ensure all blank spaces have been filled in with requested information and that the specified accompanying documents

(listed in Paragraph H.6 above) have been included in a sealed opaque envelope addressed as described in Paragraph H.5 above.

b. When the Bid Form provides for quoting either an addition or deduction for an Alternate item, indicate whether the sum named is an addition or deduction. If it is not indicated, it will be conclusively presumed that the amount is a deduction.

c. When the Bid Form provides for quoting a unit price, the Bidder should quote the unit price as set forth in the Contract Documents as described in Paragraph M.1 below.

d. When applicable, make sure that the Bid Guaranty is properly executed and signed by:

1) The Bidder
2) The Surety or Sureties

e. Make sure that the amount of the Bid Guaranty (if the Bid Guaranty is in the form of a certified check, letter of credit, or cashier's check) is for a specific sum in an amount as instructed in Paragraph H.8.a below. If the Bid Guaranty is in the form of the Bid Guaranty and Contract Bond, the amount may be left blank; if an amount is inserted, it must equal the total of the base bid and all add alternates included. If inserted, then the failure to state an amount equal to the total of the base bid and all add alternates shall make the bid non-responsive if the Owner selects alternates not included in the amount.

f. Make sure that the appropriate bid package and scope of work is inserted in the correct space on the Bid Guaranty and Contract Bond Form. Failure to include work covered by the bid submitted may make the bid non-responsive.

8. Bonds and Guarantees

a. Bid Guaranty: Bidder shall furnish a Bid Guaranty, as prescribed in Sections 153.54, 153.57, and 153.571 of the Ohio Revised Code, in the form of either: (1) a bond for the full amount of the bid in the form of the Bid Guaranty and Contract Bond included in the Contract Documents; or (2) a certified check, cashier's check, or irrevocable letter of credit in a form satisfactory to the Owner in an amount equal to 10% of the bid. Bid amount shall be the total of all sums bid, including all add alternatives, but excluding all deduct alternatives. **NOTE: AIA or EJCDC Bid Bond forms are not acceptable.**

b. Contract Bond: The successful Bidder, who, as a Bid Guaranty, submits a certified check, cashier's check, or irrevocable letter of credit in an amount equal to 10% of the bid, shall furnish a Contract Bond in the form included in the Contract Documents in an amount equal to 100% of the Contract Sum. **NOTE: AIA or EJCDC Bond forms are not acceptable.**

c. The bond must be issued by a surety company authorized by the Ohio Department of Insurance to transact business in the State of Ohio and acceptable to the Owner. The bond must be issued by a surety capable of demonstrating a record of competent underwriting, efficient management, adequate reserves, and sound investments. These

criteria will be deemed to be met if the surety currently has an A.M. Best Company Policyholders Rating of "A-" or better and has or exceeds the Best Financial Size Category of Class VI. Other sureties may be acceptable to the Owner, in its sole discretion.

d. All bonds shall be signed by an authorized agent of an acceptable surety and by the Bidder.

e. Surety bonds shall be supported by credentials showing the Power of Attorney of the agent, a certificate showing the legal right of the Surety Company to do business in the State of Ohio, and a financial statement of the Surety.

f. The Bid Guaranty, as applicable, shall be in the name of or payable to the order of the Owner.

g. The name and address of the Surety and the name and address of the Surety's Agent must be typed or printed on each bond.

9. Permits

a. Owner has obtained, or will obtain the following permits for the Project, as applicable:

Stark Soil & Water Conservation District, Zoning, Building, Plumbing, Fire Suppression, HVAC, Electrical, Fire Alarm

b. Contractor shall secure and pay for all other permits necessary to complete the Project. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

I. METHOD OF AWARD

1. All bids shall remain open for acceptance for sixty (60) days following the day of the bid opening, but the Owner may, in its sole discretion, release any bid and return the Bid Guaranty prior to that date. The Bid Guaranty shall be subject to forfeiture, as provided in the Ohio Revised Code, if a bid is withdrawn during the period when bids are being held.

2. The Owner reserves the right to reject any, part of any, or all bids and to waive any informalities and irregularities. The Bidder expressly acknowledges this right of the Owner to reject any or all bids or to reject any incomplete or irregular bid. Bidders must furnish all information requested on the Bid Form. Failure to do so may result in disqualification of the bid.

3. Determination of the Lowest and Best Bid. Subject to the right of the Owner to reject any or all bids, pursuant to the Codified Ordinances of Canton Chapters 105, 182, and 507, the Owner will award the Contract for the Work to the bidder submitting the lowest and best bid, taking into consideration accepted alternates. In evaluating bids, the Owner will consider the qualifications of the Bidders, whether or not the bids comply with the prescribed requirements, and alternates and unit prices, if requested, on the Bid Form. The Owner may also consider the qualifications and experience of subcontractors and suppliers. The Owner may conduct such investigations as are deemed necessary to establish the qualifications and financial ability of the Bidder and its subcontractors and suppliers. The factors the Owner may consider in determining which bid is the lowest and best include the factors set forth below, including the Additional Criteria. Depending upon the type of work, the Owner, in its discretion, may also consider other essential

factors, as the Owner may determine and as are included in the Specifications. The Owner, in its discretion, may consider and give such weight to these criteria as it deems appropriate. The Owner, in its discretion, reserves the right to request additional information and documentation relating to these criteria from Bidders after the bid opening.

a. Work to be subcontracted. The Bidder must identify all work to be subcontracted. See paragraph I.5 below. All subcontractors are subject to the approval of the Owner based on the criteria set forth in this Section I.

b. The Bidder's work history. The Bidder should have a record of consistent customer satisfaction and of consistent completion of projects, including projects that are comparable to or larger and more complex than the Owner's Project, on time and in accordance with the applicable Contract Documents, and based upon the Bidder's claims history. If the Bidder's management operates or has operated another construction company, the Owner may consider the work history of that company in determining whether the Bidder submitted the lowest and best bid.

The Owner will consider the Bidder's prior experience on other projects of similar scope and/or complexity including prior projects with the Owner and/or Design Professional, including the Bidder's demonstrated ability to complete its work on these projects in accordance with the Contract Documents and on time, and will also consider its ability and capacity to perform a substantial portion of the project with its own forces and its ability to work with the Owner and Engineer as a willing, cooperative, and successful team member. Bringing overstated claims, an excessive number of claims, acting uncooperatively, and filing lawsuits against project owners and/or their design professionals on prior projects of similar scope and/or complexity will be deemed evidence of a Bidder's inability to work with the Owner and Engineer as a willing, cooperative, and successful team member.

The Bidder authorizes the Owner and its representatives to contact the owners and design professionals (and construction managers, if applicable) on projects on which the Bidder has worked and authorizes and requests such owners and design professionals (and construction managers) to provide the Owner with a candid evaluation of the Bidder's performance. By submitting its bid, the Bidder agrees that if it or any person, directly or indirectly, on its behalf or for its benefit brings an action against any of such owners or design professionals (or construction managers) or the employees of any of them as a result of or related to such candid evaluation, the Bidder will indemnify and hold harmless such owners, design professionals (and construction managers) and the employees of any of them from any claims, whether or not proven, that are part of or are related to such action and from all legal fees and expenses incurred by any of them arising out of or related to such legal action. This obligation is expressly intended for the benefit of such owners, design professionals (and construction managers), and the employees of each of them.

c. The Bidder's prior history regarding timeliness of performance, quality of work, the Bidder's history of filing claims and having claims filed against it, extension requests, fines and penalties imposed and payments thereof, and contract defaults, with explanations.

d. The Bidder's compliance with federal, state, and local laws, rules, and regulations, including but not limited to the Occupational Safety and Health Act, Ohio Prevailing Wage laws, Davis Bacon, and Ohio ethics laws.

e. The Bidder's prior experience with similar work on comparable or more complex projects.

f. The number of years the Bidder has been actively engaged as a contractor in the construction industry.

g. The Bidder's recent experience record in the construction industry, including the original contract price for each construction job undertaken by the bidder, the amount of any change orders or cost overruns on each job, the reasons for the change orders or cost overruns, and the bidder's record for complying with and meeting completion deadlines on construction projects.

h. A public entities' determination, within the previous five years, that the Bidder was not a responsible bidder, the reasons given by the public entity, and the Bidder's explanation thereof.

i. The Bidder's financial ability to complete the Contract successfully and on time without resort to its Surety.

j. Financial responsibility demonstrated by the Bidder and whether Bidder possesses adequate resources and availability of credit, the means and ability to procure insurance and acceptable performance bonds required for the Project and whether any claims have been made against performance bonds secured by the bidder on other construction projects.

k. Any suspension or revocations of any professional license of any director, officer, owner, or managerial employees of the Bidder, to the extent that any work to be performed on this Project is within the field of such licensed profession.

l. The Bidder's equipment and facilities.

m. The size and experience of the Bidder's work force and the Bidder's ability to complete the Contract successfully and on time.

n. The experience and the continuity of the Bidder's work force including the project manager and project superintendent's tenure with the Bidder.

o. The Bidder's participation in a drug-free workplace program acceptable to the Owner, and the Bidder's record for both resolved and unresolved findings of the Auditor of State for recovery as defined in Section 9.24 of the Ohio Revised Code.

p. The Owner's prior experience with the Bidder's surety.

q. The Bidder's interest in the Project as evidenced by its attendance at any pre-bid meetings or conferences for bidders.

r. The adequacy, in numbers and experience, of the Bidders' work force to complete the Contract successfully and on time.

s. The foregoing information with respect to each of the Subcontractors and Suppliers that the Bidder intends to use on the Project.

4. Qualifications Statement. Each Bidder will submit with its bid a completed Contractor Qualifications Statement, which is included with the Contract Documents, and thereafter provide the Owner promptly with such additional information as the Owner may request regarding the Bidder's qualifications. A Bidder shall submit any requested additional information within three (3) business days of the date on the request.

5. List of Subcontracted Work Categories. Each Bidder will submit with its bid a completed list of Subcontracted Work Categories, which is included with the Contract Documents, and thereafter provide the Owner promptly with such additional information as the Owner may request regarding the Bidder's qualifications. A Bidder shall submit any requested information within three (3) business days of the date on the request.

6. Additional Criteria for Determining Lowest and Best Bid. Pursuant to the Codified Ordinances of the City of Canton, Chapter 105, the Owner, in its discretion, may consider any or all of the Additional Criteria below in determining which bid is lowest and best.

   a. Any OSHA violations within the previous three years, as well as all notices of OSHA citations filed against the Bidder in the same three year period, together with a description and explanation of remediation or other steps taken regarding such violations and notices of violation.

   b. Any violations within the previous five years pertaining to unlawful intimidation or discrimination against any employee by reason of race, creed, color, disability, gender, or national origin, and/or violation of any employee's civil or labor rights or equal employment opportunities.

   c. Any litigation in which the Bidder has been named as a defendant or third party defendant in an action involving a claim for personal injury or wrongful death arising from performance of work related to any project in which it has been engaged within the previous five years. Bidders shall provide copies of pleadings.

   d. Allegations of violations of the prevailing wage law and any other state or federal labor law, including, but not limited to, child labor violations, failure to pay wages, or unemployment insurance tax delinquencies or unfair labor practices within the past five years.

   e. Violations of the workers compensation law.

   f. Any criminal convictions or criminal indictments, involving the Bidder, its officers, directors, owners, and/or managers within the past five years.

   g. Any violation within the past five years or pending charges concerning federal, state, or municipal environmental and/or health laws, codes, rules, and/or regulations.

   h. Documentation that the Bidder provides health insurance and pension benefits to its employees.

   i. Whether the Bidder participates in a bona fide apprenticeship program that is approved by the Ohio State Apprenticeship Council and the United States Department of Labor.

   j. Whether the Bidder has adopted and implemented a comprehensive drug and alcohol testing program for its employees.

   k. Whether the Bidder's employees are OSHA-10 and/or OSHA-30 certified.

   l. The Bidder's commitment to comply with the Owner's Contract Compliance Program regarding equal employment opportunity. Each Bidder shall file contract employment reports with the Owner's contracting agency or as may be directed by the Owner or its representative. Such contract employment reports shall include such information as to the employment practices, policies, programs, and statistics of the Bidder and shall be in such form as the Owner may prescribe.

m. The foregoing information with respect to each of the Subcontractors and Suppliers that the Bidder intends to use on the Project.

7. The failure to submit information that Owner has the right to receive under these Instructions to Bidders on a timely basis may result in the determination that the Bidder has not submitted the lowest and best bid.

8. By submitting its bid, the Bidder agrees that the Owner's determination of which bidder is the lowest and best bidder shall be final and conclusive, and that if the Bidder or any person on its behalf challenges such determination in any legal proceeding, the Bidder will indemnify and hold the Owner and its employees and agents harmless from any claims included or related to such legal proceeding, and from legal fees and expenses incurred by the Owner, its employees, or agents that arise out of or are related to such challenge.

9. After bid opening, within three (3) business days of a request made by the Owner, the apparent low Bidder and any other Bidder so requested by the Owner must submit the following:

For all subcontracts with an estimated value of at least $50,000, a list of all Subcontractors that the Bidder will use to construct the Project, as well as an indication of whether or not the Bidder has ever worked with a proposed Subcontractor before, including the following information for the <u>three</u> most recent projects on which the Bidder and each Subcontractor have worked together:

i. Project Owner

ii. Project Name

iii. Subcontract Scope

iv. Subcontract Value

v. Owner's contact name and phone number.

If Bidder and a proposed Subcontractor have not worked together on at least three projects in the past five years, Bidder must submit the information set forth above for the three most recent similar projects to the Project that a proposed Subcontractor has worked on.

The above Subcontractor information, as well as the criteria set forth in Paragraph I.3 herein, as it pertains to each Subcontractor may be used in the Owner's determination of the lowest and best bid.

Once a Bidder identifies its proposed Subcontractors as set forth in this Paragraph I.9, the list shall not be changed unless written approval or direction for the change is made by Owner.

10. <u>Additional Post-Bid Submittals</u>

a) <u>Affidavit as to Personal Property Taxes</u>. The successful Bidder shall submit, prior to the time of the entry into the Contract, an affidavit in the form required by Section 5719.042, Ohio Revised Code, regarding the status of the Bidder's personal property taxes. A copy of the affidavit form is included with the Contract Documents.

11. The Owner reserves the right to disqualify bids, before or after opening, upon evidence of collusion with intent to defraud or other illegal practices on the part of the Bidder.

12. Award of Contract. The award of the Contract will only be made pursuant to approval of the City's Board of Control.

J. EXECUTION OF CONTRACT

1. Within the time designated by the Owner after award of the Contract, the successful Bidder shall execute and deliver to the Owner the required number of copies of the Owner-Contractor Agreement, in the form included in the Contract Documents, and all accompanying documents requested, including, but not limited to, a Contract Bond (if applicable), insurance certificates, and a valid Workers' Compensation Certificate. The successful Bidder shall have no property interest or rights under the Owner-Contractor Agreement until the Agreement is executed by the Owner.

K. SUBSTITUTIONS/NON-SPECIFIED PRODUCTS

1. Certain brands of material or apparatus may be specified. Should this be the case, each bid will be based on these brands, which may be referred to in the Contract Documents as Standards. The use of another brand (referred to as a substitution or proposed equal in the Contract Documents, when a bidder or the contractor seeks to have a different brand of material or apparatus than that specified approved by the Owner of use in the Project) may be requested as provided herein. Substitutions, however, will not be considered in determining the lowest and best bid.

2. The products specified in the Contract Documents establish a standard of required function, dimension, appearance, and quality.

3. Bidders wishing to obtain approval to bid non-specified products shall submit written requests to the Owner a minimum of seven (7) working days before the bid date and hour. To facilitate the submission of requests, a Substitution Form is included in the Contract Documents. The Bidder shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution, including the name of the proposed manufacturer and/or product and a complete description of the product including the manufacturer's name and model number or system proposed, drawings, product literature, performance and test data, color selections or limitations, and any other information necessary for evaluation. Include a statement including any changes in other materials, equipment, or other work that would be required if the proposed product is incorporated in the work. The burden of proof of the merit of the proposed product is on the proposer. The Owner's decision on approval of a proposed product will be final.

   The following will be cause for rejection of a proposed substitution:

   a. Requests submitted by subcontractors, material suppliers, and individuals other than Bidders;

   b. Requests submitted without adequate documentation;

   c. Requests received after the specified cut-off date;

   d. Requests, which in the sole discretion of the Owner, do not offer a sufficient benefit to the Project.

4. When the Owner approves a product submission before receipt of bids, the approval will be included in an Addendum, and Bidders may include the pricing of this product in their bid. Bidders shall not rely on approvals made in any other manner.

5. In proposing a non-specified product or a substitution, the Bidder represents and warrants that each proposed product will not result in any changes to the Project, including changes to the Work or other contractors, or any decrease in the performance of any equipment or systems to be installed in the Project and agrees to pay any additional costs incurred by the Owner and the Owner's consultants as a result of a non-specified or substitute product that is accepted.

6. If an addendum is issued approving a substitution for a specified Standard, any Bidder proposed to use said substitution must indicate so with its Bid, using the form provided.

7. Following the award of the Contract, there shall be no substitution for specified products, except pursuant to a Change Order. The Owner in its sole discretion may decline to consider a substitution for a Change Order.

8. The Owner reserves the right to value engineer any item within the specifications if it is deemed to be in the best interest of the Owner.

L. ALTERNATES

1. The Owner may request bids on alternates. At the time of awarding the Contract, the Owner will select or reject alternates as it determines is in its best interest. A Bidder's failure to include on its Bid Form the cost of an alternate selected by the Owner and applicable to the Bidder's work shall render the bid non-responsive and be grounds for the rejection of the bid. Otherwise, the failure to include the cost of an alternate will not be deemed material.

2. The Bidder acknowledges that although there is an estimate for the cost of the Project, the market conditions may and frequently do result in the estimate being different from the sum of the bids received, either higher or lower. The Bidder understands that the Owner may include alternates, which may include deduct alternates as well as add alternates, to give it flexibility to build the Project with the funds available. The Bidder further understands and acknowledges that use of add and deduct alternates is a long held customary practice in the construction industry in the State of Ohio. The Bidder also acknowledges that the Owner will not make a decision about the alternates on which to base the award of contracts until the bids are received, and the Owner can compare its available funds with the base bids and the cost or savings from selecting different alternates. The Bidder understands that the award to the Bidder submitting the lowest and best bid will be based on the base bid plus selected alternates, and may result in an award to a Bidder other than the Bidder that submitted the lowest base bid.

M. UNIT PRICES

1. Where unit prices are requested in the Bid Form the Bidder should quote a unit price. Unless otherwise expressly provided in the Contract Documents, such unit prices shall include all labor, materials, and services necessary for the timely and proper installation of the item for which the unit prices are requested. The unit prices quoted in the bid shall be the basis for any Change Orders entered into under the Owner-Contractor Agreement, unless the Owner determines that the use of such unit prices will cause substantial inequity to either the Contractor or the Owner.

N. ADDENDA

1. All questions should be submitted in writing at least five (5) business days prior to the bid opening. **This is 3/30/2022, 2:00:00 PM.** The Owner reserves the right to issue Addenda

changing, altering, or supplementing the Contract Documents prior to the time set for receiving bids. The Owner will issue the Addenda to clarify bidders' questions and/or to change, alter, or supplement the Contract Documents.

2. Any explanation, interpretation, correction, or modification of the Contract Documents will be issued in writing in the form of an Addendum, which shall be the only means considered binding; explanations, interpretations, etc., made by any other means shall NOT be legally binding. All Addenda shall become a part of the Contract Documents.

3. All Addenda will be issued, except as hereafter provided, via the current City bid tool at least seventy-two (72) hours prior to the published time for the opening of bids, excluding Saturdays, Sundays, and legal holidays. If any Addendum is issued within such seventy-two (72) hour period, then the time for opening of bids shall be extended one (1) week with no further advertising of bids required.

4. Copies of each Addendum will be posted via the Owner's current bid tool and it is the responsibility of the bidder or any other interested party to check the bid tool for any updates or addenda. Receipt of Addenda shall be indicated by Bidders in the space provided on the Bid Form. Bidders are responsible for acquiring issued Addenda in time to incorporate them into their bid. Bidders should check the Owner's bid tool prior to the bid opening to verify the number of Addenda issued.

5. Each Bidder shall carefully read and review the Contract Documents and immediately bring to the attention of the Owner any error, omission, inconsistency, or ambiguity therein.

6. If a Bidder fails to indicate receipt of all Addenda through the last Addendum issued by the Owner on its Bid Form, the bid of such Bidder will be deemed to be responsive only if:

   a. The bid received clearly indicates that the Bidder received the Addendum, such as where the Addendum added another item to be bid upon and the Bidder submitted a bid on that item; or

   b. The Addendum involves only a matter of form or is one which has either no effect or has merely a trivial or negligible effect on price, quantity, quality, or delivery of the item bid upon.

O. INTERPRETATION

1. If a Bidder contemplating submitting a bid for the proposed Project is in doubt as to the true meaning of any part of the Contract Documents, it may submit a written request for an interpretation thereof to the Owner at purchasing@cantonohio.gov. Requests received fewer than 5 days prior to bid opening may not be answered. Any interpretation of the proposed documents will be made by Addendum only and will be made available by the City's web tool. The Owner will not be responsible for any other explanation or interpretation of the proposed documents.

2. In interpreting the Contract Documents, words describing materials that have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with the well-known meaning recognized by the trade.

3. Bidders are responsible for notifying the Owner in a timely manner of any ambiguities, inconsistencies, errors, or omissions in the Contract Documents. The Bidder shall not, at any time after the execution of the Contract, be compensated for a claim alleging insufficient data, incomplete Contract Documents, or incorrectly assumed conditions

regarding the nature or character of the Work, if no request was made by the Bidder prior to the bid opening.

P. STATE SALES AND USE TAXES

1. The Owner is a political subdivision of the State of Ohio and is exempt from taxation under the Ohio Sales Tax and Use Tax Laws. Building materials that the successful Bidder purchases for incorporation into the Project will be exempt from state sales and use taxes if the successful Bidder provides a properly completed Ohio Department of Taxation Construction Contract Exemption Certificate to the vendors or suppliers when the materials are acquired. The Owner will execute properly completed certificates on request.

Q. DATE FOR SUBSTANTIAL COMPLETION/DATE FOR FINAL COMPLETION/LIQUIDATED DAMAGES

1. Dates for Substantial Completion. The Contract Time shall run from the date of the Notice to Proceed or if there is no Notice to Proceed from the Effective Date of the Owner-Contractor Agreement. The Date for Substantial Completion and the Contract Time may be extended only by Change Order. **By submitting its Bid, each Bidder agrees that the period for performing its Work is reasonable.**

   a. Date for Overall Project Substantial Completion. The successful Bidder shall have all of its Work on the Project Substantially Complete (as Substantial Completion is defined in the Contract Documents) by the following date as applicable to the Bidder's scope of work.

      Date for Substantial Completion (aka Contract Time) expressed as calendar days from Notice to Proceed:

      210 calendar days

2. Liquidated Damages.

   a. Overall Project Substantial Completion. If the successful Bidder does not have its Work Substantially Complete by its Date for Substantial Completion or Finally Complete within thirty (30) calendar days of achieving Substantial Completion, whichever may be applicable, the successful Bidder shall pay the Owner and the Owner may set off from amounts otherwise due the successful Bidder Liquidated Damages. The daily amounts of Liquidated Damages for Overall Project Substantial Completion are set forth in the tables included in the Owner-Contractor Agreement. The total amount of Liquidated Damages will be calculated based on the total number of calendar days beyond the Date for Substantial Completion that the Bidder's Work is not Substantially Complete or to the extent that its Work is not Finally Complete more than thirty (30) calendar days after the Substantial Completion of its Work, i.e., number of late days times the per diem rate(s) for Liquidated Damages in the tables.

3. The Bidder acknowledges and agrees, by submitting its bid for the Work and entering into a Contract with the Owner, that such amounts of Liquidated Damages represent a reasonable estimate of the actual damages for loss of or interference with the intended use of the Project that the Owner would incur if the Bidder's Work is not Substantially Complete by its Date for Substantial Completion and/or not Finally Complete by thirty (30) days of the Date of Substantial Completion. The Bidder further acknowledges, agrees and understands that it may seek an extension of the Contract Time (and its Date for Substantial Completion) to avoid or reduce Liquidated Damages by properly following the Claim procedures in the Contract Documents.

R. OWNER'S RIGHT TO WAIVE DEFECTS AND IRREGULARITIES

1. The Owner reserves the right to waive any and all irregularities provided that the defects and irregularities do not affect the amount of the bid in any material respect or otherwise give the Bidder a competitive advantage.

S. MODIFICATION/WITHDRAWAL OF BIDS

1. Modification. A Bidder may modify its bid by written communication to the Owner at any time prior to the scheduled closing time for receipt of bids, provided such written communication is received by Owner prior to the bid deadline. The written communication shall not reveal the bid price, but should provide the addition or subtraction or other modification so that the final prices or terms will not be known until the sealed bid is opened. If the Bidder's written instructions with the change in bid reveal the bid amount in any way prior to the bid opening, the bid may be rejected as non-responsive.

2. Withdrawal Prior to Bid Deadline. A Bidder may withdraw its bid at any time for any reason prior to the bid deadline for the opening of bids established in the Legal Notice. The request to withdraw shall be made in writing to and received by the Owner prior to the time of the bid opening.

3. Withdrawal after Bid Deadline.

   a. All bids shall remain valid and open for acceptance for a period of at least 60 days after the bid opening; provided, however, that a Bidder may withdraw its bid from consideration after the bid deadline when all of the following apply:

      (1) the price bid was substantially lower than the other bids;

      (2) the reason for the bid being substantially lower was a clerical mistake, rather than a mistake in judgment, and was due to an unintentional and substantial error in arithmetic or an unintentional omission of a substantial quantity of work, labor, or material;

      (3) the bid was submitted in good faith; and

      (4) the Bidder provides written notice to the Owner within two (2) business days after the bid opening for which the right to withdraw is claimed.

   b. No bid may be withdrawn under this provision if the result would be the awarding of the contract on another bid for the bid package from which the Bidder is withdrawing its bid to the same Bidder.

   c. If a bid is withdrawn under this provision, the Owner may award the Contract to another Bidder determined by the Owner to be the lowest and best bidder or the Owner may reject all bids and advertise for other bids. In the event the Owner advertises for other bids, the withdrawing Bidder shall pay the costs incurred in connection with the rebidding by the Owner, including the cost of printing new Contract Documents, required advertising, and printing and mailing notices to prospective bidders, if the Owner finds that such costs would not have been incurred but for such withdrawal.

T. COMPLIANCE WITH APPLICABLE LAWS

1. By submitting a bid for Work on the Project, the Bidder acknowledges that it is in compliance with applicable federal, state, and local laws and regulations, including, but not limited to, the following:

   a. Equal Employment Opportunity/Nondiscrimination. The Bidder agrees that if it is awarded a contract that in the hiring of employees for performance of work under the contract or any subcontract, neither it nor any subcontractor, or any person acting on its behalf or its subcontractor's behalf, by reason of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color, shall discriminate against any citizen of the state in the employment of labor or workers who are qualified and available to perform work to which the employment relates. The Bidder further agrees that neither it nor any subcontractor or any person on its behalf or on behalf of any subcontractor, in any manner, shall discriminate against or intimidate any employees hired for the performance of the work under the contract on account of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color.

   b. Ethics Laws. The Bidder represents that it is familiar with all applicable ethics law requirements, including without limitation Sections 102.04 and 3517.13 of the Ohio Revised Code, and certifies that it is in compliance with such requirements.

U. FINDINGS FOR RECOVERY

1. By submitting its bid, each Bidder certifies for reliance of the Owner that it has no unresolved finding for recovery against it issued by the Auditor of the State of Ohio on or after January 1, 2001, except as permitted by Section 9.24 (F) of the Ohio Revised Code.

V. PREVAILING WAGES

1. The Project is a "Construction" project as defined in Section 4115.03 of the Ohio Revised Code. If the Project is defined as such as "Construction" project, the successful Bidder and all of its subcontractors, regardless of tier, will strictly comply with its obligation to pay a rate of wages on the Project not less than the rate of wages fixed for this Project under Section 4115.04 of the Ohio Revised Code. Additionally, the successful Bidder will comply with all other provisions of Chapter 4115 of the Ohio Revised Code.

W. DBE PARTICIPATION GOALS

1. Owner has established the following Disadvantaged Business Enterprise ("DBE") participation goal for the Project as a percentage of the Contract Price:

   N/A%

2. Any Minority Business Enterprise ("MBE") or Woman-Owned Business Enterprise ("WBE") proposed to count towards the DBE participation goal must first be certified at bid time as an MBE or WBE under the Ohio Department of Administrative Services MBE Cross Certification Program (which includes MBEs and WBEs certified by the City of Canton), or certified as a DBE under Ohio's Unified Certification Program administered by the Ohio Department of Transportation.

3. Documentation of DBE Participation. Each Bidder must submit with its bid a list identifying its DBE subcontractors and participation rates as a percentage of the Contract Price.

4. Certification of Good Faith Efforts. If a Bidder has not met the DBE participation goal, it must attach to its bid, a narrative (which may include exhibits) demonstrating the good faith efforts made by the Bidder to secure DBE participation in the Project. Good faith efforts include:

   - Conducting outreach and recruiting activities;
   - Informing DBEs of the opportunity to participate in the Project at least 30 calendar days before the bid closes;
   - Considering subcontracting with a consortium of DBEs; and
   - Using the services and assistance of the Small Business Administration and Minority Development Agency of the U.S. Department of Commerce.

   Owner, in its sole discretion, will be the sole evaluator of whether any particular Bidders' efforts sufficiently demonstrate good faith efforts for securing DBE participation.

5. Challenges to Owner's Discretion. If any Bidder directly challenges, or indirectly challenges through contribution of money or other resources to a third party, Owner's discretion in determining any Bidder's compliance with the DBE goal stated in these Instructions to Bidders, or good faith efforts pertaining to same, that Bidder agrees to indemnify Owner for all claims, costs, losses and damages, including attorney and consultant fees, arising out of such challenge, should there be an adjudication by a court of competent jurisdiction that the Owner did not abuse its discretion in making its determination.

6. Failure to Comply. If a Bidder is awarded a contract for the Project, and later fails to fulfill its stated DBE participation goals, that Bidder agrees to indemnify Owner for all claims, costs, losses and damages, including attorney and consultant fees, arising out of such failure. That Bidder also agrees to cooperate with all reasonable requests to determine actual DBE participation, including but not limited to certifying actual participation and providing documentation in support of same.

X. OTHER LOCAL ORDINANCE REQUIREMENTS

1. Each Bidder, by the act of submitting its bid agrees to withhold all City income taxes due or payable under Chapter 182 of the Codified Ordinances of the City of Canton for wages, salaries, fees, and commissions paid to its employees and further agrees that any of its subcontractors shall be required to agree to withhold any such City income taxes due for services performed under this Agreement. Bidder agrees with the Owner regarding the manner of withholding of City income taxes as provided in Section 718.011(F) of the Ohio Revised Code. Municipal income tax withholding provisions of Section 718.011(B)(1) and 718.011(D) of the Ohio Revised Code shall not apply to qualifying wages paid to employees for work done or services performed or rendered inside the City or on City property. Each Bidder agrees to withhold income tax for the City from employees' qualifying wages earned inside the City or on City property, beginning with the first day of work done or services performed or rendered inside the City.

2. Each Bidder, by the act of submitting its bid agrees that all steel necessary in the construction of the Work performed under the Agreement shall be steel that is produced in the United States unless a specific product which is required is not produced by manufacturers in the United States in which event this prohibition does not apply.

3. Each Bidder, by the act of submitting its bid agrees that all materials used in the construction covered by the Agreement shall be purchased in the Canton area except such materials which are unavailable in the Canton area.

4. Chapter 105.12 – Local Bidder Preference.

a. The Board of Control, in determining the lowest and best bidder in the award of contracts to which this section is applicable, is authorized to award contracts to local bidders as hereinafter defined, whose bid is not more than five percent (5%) higher, subject to a maximum amount of twenty thousand dollars ($20,000.00), than the lowest dollar bid submitted by non-local bidders. The Board of Control's decision in making such an award shall be final.

b. For purposes of this section, "local bidder" means an individual or business entity which at the time of the award of the contract has a headquarters, division, sales office, sales outlet, manufacturing facility, or similar significant business-related location in Stark County, Ohio.

c. All contract specifications and/or bid documents that are distributed by Canton for the purpose of soliciting bids for goods and/or services shall contain the following notice:

Prospective bidders will take notice that the City of Canton, in determining the lowest and best bidder in the award of this contract, may award a local bidder preference to any qualified bidder pursuant to Section 105.12 of the Codified Ordinances of the City of Canton. The determination of whether a bidder qualifies for the local preference shall be made by Board of Control. The Board's decision shall be final. A copy of Section 105.12 is attached.

d. This section shall be applicable to all contracts for equipment, goods, machinery, materials, supplies, vehicles and/or services, which are purchased, leased and/or constructed at a cost in excess of fifty thousand dollars ($50,000.00) and which require bidding pursuant to Ohio R.C. 735.05 through 735.09 and Ohio R.C. 737.03. (Ord. 115-2018. Passed 5-14-18.)

5. Each Bidder, by the act of submitting its bid agrees as follows during the performance of the Agreement:

a. The Contractor shall not discriminate against any employee or applicant for employment because of race, age, handicap, religion, color, sex, national origin, sexual orientation, or gender identity. The Contractor shall take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to race, religion, color, sex, national origin, military status, sexual orientation, or gender identity. As used herein, the word "treated" shall mean and include without limitation the following: recruited, whether by advertising or other means; compensation, whether in the form of rates or pay or other forms of compensation; selected for training, including apprenticeship; promoted; demoted; upgraded; downgraded; transferred; laid off; and terminated. The Contractor agrees to and shall post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting officers setting forth the provisions of this nondiscrimination clause.

b. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, age, handicap, religion, color, sex, national origin, military status, sexual orientation, or gender identity.

c. The Contractor shall send to each labor union or representative of workers, with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the Contractor's commitments under the equal opportunity clause of the Owner; and it shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. The Contractor shall submit in writing to the Owner its affirmative action plan, and each subcontractor and supplier of equipment or supplies shall submit to the Contractor its affirmative action plan. The responsibility for securing these affirmative action plans falls upon the Contractor and shall be on file at the office of the Contractor. The Contractor shall furnish all information and reports required by the Owner or its representative pursuant to the Contract Documents, and shall permit access to its books, records, and accounts by the contracting agency of the Owner and by the Executive Secretary of the Owner for purposes of investigation to ascertain compliance with the program.

e. The Contractor shall take such action with respect to any subcontractor as the Owner may direct as a means of enforcing the provisions of this equal opportunity clause, including penalties and sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in or is threatened with litigation as is necessary to protect the interests of the Owner and to effectuate the Owner's equal opportunity program and, in the case of contracts receiving Federal assistance, the Contractor or the Owner may request the United States to enter into such litigation to protect the interests of the United States.

f. The Contractor shall file and shall cause its subcontractors, if any, to file compliance reports with the Owner in the form and to the extent prescribed by the Owner or its representative. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs, and statistics of the Contractor and its subcontractors.

g. The Contractor shall include the provisions of this equal employment opportunity clause in every subcontract or purchase order, so that such provisions will be binding upon each subcontractor or vendor.

h. Refusal by the Contractor or subcontractor to comply with any portion of this program as herein stated and described will subject the offending party to any or all of the following penalties:

(1) Withholding of all future payments under the involved public contract to the Contractor in violation, until it is determined that the Contractor or subcontractor is in compliance with the provisions of the Agreement.

(2) Refusal of all future bids for any public contract with the Owner or any of its departments or divisions, until such time as the Contractor or subcontractor demonstrates that it has established and shall carry out the policies of the program as herein outlined.

(3) Cancellation of the public contract and declaration of forfeiture of the performance bond.

(4) In cases is which there is substantial or material violation or the threat of substantial or material violation of the compliance procedure or as may be provided by contract, appropriate proceedings may be brought to enforce these provisions, including enjoining within applicable laws of contractors, subcontractors, or other organizations, individuals, or groups who prevent, directly or indirectly, or seek to prevent, directly or indirectly, compliance with the policy as herein outlined.

2. A Project Labor Agreement (PLA) has been required for this project (See Appendix A if applicable). Prevailing Wages are required for this Project (See Appendix B).

Y. OHIO PUBLIC WORKS COMMISSION FUNDING

1. **No** When this line is checked by the Owner, e.g. with an "X" or other mark, the Project is being funded in whole or part by the Ohio Public Works Commission ("OPWC"), and the requirements of the OPWC, attached to these Instructions to Bidders, apply.

2. The OPWC requirements include that the Bidder include with its bid certification of agreement and compliance with certain statements and covenants regarding its subscription to the State's Equal Employment Opportunity Requirements for State-assisted Construction Contracts.

END OF INSTRUCTIONS TO BIDDERS

OWNER-CONTRACTOR AGREEMENT

[Where Engineer is a Third Party Hired by Owner and Engineer Has Construction Administration Duties]

Owner:
The City of Canton
218 Cleveland Avenue SW
Canton, OH 44702
Telephone: 330.489.3283

Contract:
Ordinance: TBD
Alternates:

Contractor:
Telephone:
Fax:

Project: Collection Systems Service Center Garage Addition and Administration Offices Renovation

This document is an agreement between the Owner and the Contractor for the Work described in the Contract Documents related to the Contract identified above for the Project defined above and is effective as of the date the Agreement is signed by the Owner (the "Effective Date").

The Owner and the Contractor agree as set forth in the following sections:

1. CONTRACT DOCUMENTS. The Contract Documents consist of the following documents:

A. Legal Notice;
B. Instructions to Bidders;
C. Bid Form;
D. Owner-Contractor Agreement;
E. General Conditions of the Contract for Construction (EJCDC C-700), as modified;
F. Supplementary Conditions (when applicable);
G. Drawings;
H. Specifications;
I. Addenda issued;
J. Contractor's Personal Property Tax Affidavit (O.R.C. 5719.042);
K. Statement of Claim Form; and
L. Modifications issued after the execution of the contract, including:
   i. A Change Order;
   ii. A Work Change Directive; or,
   iii. A written order for a minor change of the Work issued by the Owner or Engineer in accordance with the General Conditions.

M. **No**__ When this line is checked by the Owner, e.g. with an "X" or other mark, the State of Ohio Department of Transportation, Construction and Material Specifications, effective as of January 1, 2019, will be a Contract Document, but only as modified by the document titled *ODOT Manual Supplement*, prepared by Owner.

1.1 Notwithstanding anything in the Contract Documents to the contrary, in the event of any inconsistency, the provisions of this Agreement shall control over any other Contract Document, proposal, document, or other attachment. In the event inconsistencies, conflicts, or ambiguities between or among the Contract Documents

are discovered after execution of the Agreement, Contractor shall provide the better quality or greater quantity of Work or comply with the more stringent requirements.

Note: **Non-Contract Documents**. The following are the reports and tests of subsurface conditions at or contiguous to the Site, if any, that the Engineer has used in preparing the Contract Documents. These are not Contract Documents. Geotechnical data is not a warranty of subsurface conditions and is not to be relied upon as a complete representation of all possible soil conditions. It is possible that there may be other reports, and/or tests of subsurface conditions at or contiguous to the Site not prepared by or on behalf of Owner. The Owner makes no representation about such reports and/or tests, assuming they exist. Additional information, if needed by Contractor for geotechnical data or site survey, shall be obtained by the Contractor at no additional cost to Owner. The General Conditions, as modified, contain additional terms related to these reports and tests.

Contractor may rely upon the general accuracy of the “technical data” contained in such reports and drawings listed below, and except for such reliance on “technical data,” Contractor shall not rely upon or make any claim against Owner or Engineer with respect to: (1) the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or (2) other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or (3) any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information. For example, all interpolations and extrapolations of data performed by Contractor to estimate locations or quantities of subsurface strata are independent factual assumptions which Owner does not warrant. (Not applicable, if none are listed).

Geotechnical Exploration Report for the City of Canton Collection Systems: Service Center Building Addition, 2901 Regent Avenue NE, Canton, Ohio 44705 (July 15, 2021) prepared by Wertz Geotechnical Engineering.

Note: **Non-Contract Documents**. The following are those reports and drawings related to any Hazardous Conditions at the Site, if any. These are not Contract Documents. The General Conditions, as modified, contain additional terms related to these reports and drawings. (None if none are listed).

2. ENGINEER RELATIONSHIP. The Contract Documents shall not be construed to create a contractual relationship of any kind between the Engineer and the Contractor or any Subcontractor or Material Supplier to the Project. The Engineer, however, shall be entitled to performance of the obligations of the Contractor intended for its benefit and to enforcement of such obligations, but nothing contained herein shall be deemed to give the Contractor or any third party any claim or right of action against the Engineer that does not otherwise exist without regard to this Contract. The Contractor and its Subcontractors shall not be deemed to be beneficiaries of any of the acts or services of the Engineer that are performed for the sole benefit of the Owner. The Contractor shall forward all communications to the Owner through the Engineer and hereby acknowledges and agrees that any instructions, reviews, advice, approvals, orders, or directives that are rendered to it by the Engineer are specifically authorized and directed by the Owner to the Contractor through the Engineer acting on behalf of the Owner.

Engineer will be performing construction administration duties as identified in the General Conditions, including, but not limited to: reviewing Applications for Payment, Change Proposals, Claims, and Shop Drawings; measuring Work quantities; and issuing Work Change Directives.

2.1 The Engineer is:
Motter & Meadows Architects
600 Market Avenue North
Canton, Ohio 44702

3. TIME FOR COMPLETION AND PROJECT COORDINATION.

3.1 DATE OF COMMENCEMENT. The date of commencement of the Work shall be the date identified in the Notice to Proceed issued by the Owner, or by the Owner through the Engineer, to the Contractor, or if there is no Notice to Proceed, the Effective Date of this Agreement.

3.2 DATE OF SUBSTANTIAL COMPLETION. The Project and Work for the Project consists of all labor, materials, equipment, and services necessary for construction of the Project, all in accordance with the Drawings and Specifications prepared by the Owner or Engineer. The Contractor shall achieve Substantial Completion of its Work on the Project, as defined in the General Conditions, within **210 calendar days** of the Date of Commencement ("Date of Substantial Completion"). Substantial Completion is the time at which the Work has progressed to the point where the Work is sufficiently complete, in accordance with the Contract Documents, so that the Work can be utilized for the purposes for which it is intended.

3.2.1 DATE OF FINAL COMPLETION. The Contractor shall achieve Final Completion of its Work on the Project, as defined in the General Conditions, within **30 calendar days** of the Date of Substantial Completion ("Date of Final Completion"). Final Completion shall mean that the Work is complete in accordance with the Contract Documents and the Contractor has submitted to the Owner or Engineer all documents required to be submitted to the Owner or Engineer for final payment.

3.2.2 UTILITIES AND OPERATIONS. Contractor shall not interrupt utilities to facilities or existing operations without prior written notice and approval by Owner.

3.2.3 SHUTDOWN DATES. Due to events scheduled by the Owner and/or other Owner considerations, Contractor will not be able to perform Work on the Project on the following dates (there are no shutdown dates if none are listed):

Contractor's Construction Schedule for performing the Work shall account for Contractor not being able to perform Work on these dates and the contractual dates for Substantial Completion and Final Completion will not be changed due to Contractor not being able to perform Work on these dates.

3.3 CONSTRUCTION SCHEDULE. The Construction Schedule shall be developed by the Contractor as provided in the Contract Documents.

3.4 LIQUIDATED DAMAGES. If the Contractor does not have its Work on the Project Substantially Complete by the specified Date for Substantial Completion or Finally Complete by the Date of Final Completion, the Contractor shall pay the Owner (and the Owner may set off from sums coming due the Contractor) Liquidated Damages in the per diem amounts as set forth in the following tables, whichever may be applicable. "Contract Amount" of the Work will be determined by totaling the cost of all line items of Work.

LIQUIDATED DAMAGES – DATE FOR SUBSTANTIAL COMPLETION OF OVERALL PROJECT

Original Contract Amount	Dollars Per Day
$1.00 to $500,000.00	$ 750.00
$500,000.01 to $2,000,000.00	$ 1,000.00
$2,000,000.01 to $10,000,000.00	$ 1,300.00
$10,000,000.01 to $50,000,000.00	$ 2,000.00
$50,000,000.01 and greater	$ 2,500.00

LIQUIDATED DAMAGES – FINAL COMPLETION

Original Contract Amount	Dollars Per Day
$1.00 to $500,000.00	$ 200.00
$500,000.01 to $2,000,000.00	$ 250.00
$2,000,000.01 to $10,000,000.00	$ 325.00
$10,000,000.01 to $50,000,000.00	$ 500.00
$50,000,000.01 and greater	$ 625.00

LIQUIDATED DAMAGES FOR SUBSTANTIAL COMPLETION FOR ANY INTERIM MILESTONE SCOPE WILL BE $1,000 PER DAY FOR EACH DAY OF UNEXCUSED DELAY BEYOND THE MILESTONE.

The Contractor acknowledges that such amounts of Liquidated Damages represent a reasonable estimate of the actual damages for loss of or interference with the intended use of the Project that the Owner would incur if the Contractor's Work is not Substantially Complete by its Date for Substantial Completion or Finally Complete by the required date for Final Completion.

4. **CONTRACT SUM (also called Contract Price).** The Contract Sum to be paid by the Owner to the Contractor, as provided herein, for the satisfactory performance and completion of the Work and all of the duties, obligations, and responsibilities of the Contractor under this Agreement and the other Contract Documents is , subject to adjustment as set forth in the Contract Documents. The Contract Sum includes Allowances, Accepted Alternates, and all federal, state, county, municipal, and other taxes imposed by law, including but not limited to any sales, use, commercial activity, and personal property taxes payable by or levied against the Contractor on account of the Work or the materials incorporated into the Work. The Contractor will pay any such taxes. The Contract Sum includes the following:

4.1 Base Bid Amount: (Lump Sum Bid); and

4.2 Accepted Alternates, included in the Contract Sum:

Alternate No.	Description	Amount
1	Remove existing gas line and replace with new gas line from meter to generator, due to possible conflict with subgrade elevation at new parking spaces.	$4,000.00
2	N/A	N/A

4.3 Allowances included in the Contract Sum:

Allowance Description	Amount
Allowance #1: General Purpose Construction Allowance	$40,000.00
Allowance #2: N/A	N/A

4.4 If after Substantial Completion of its Work, the Contractor fails to submit its final payment application with all the documents required to be submitted with such application within ninety (90) days after written notice to do so from the Owner and without prejudice to any other rights and remedies the Owner may have available to it, the balance of the Contract Sum shall become the Owner's sole and exclusive property, and the Contractor shall have no further interest in or right to such balance.

5. RETAINAGE. Retainage applicable to the Contract by Ohio Revised Code Sections 153.12, .13, and .14 will be withheld as defined in the Modified General Conditions. The Contractor agrees that the financial institution selected by the Owner for deposit of retained funds is acceptable to the Contractor and will sign any documents requested related to said account.

6. GENERAL.

6.1 MODIFICATION. No modification or waiver of any of the terms of this Agreement or of any other Contract Documents will be effective against a party unless set forth in writing and signed by or on behalf of a party. In the case of the Owner, the person executing the modification or waiver must have express authority to execute the Modification on behalf of the Owner pursuant to a resolution that is duly adopted by the Owner. Under no circumstances will forbearance, including the failure or repeated failure to insist upon compliance with the terms of the Contract Documents, constitute the waiver or modification of any such terms. The parties acknowledge that no person has authority to modify this Agreement or the other Contract Documents or to waive any of its or their terms, except as expressly provided in this section.

6.2 ASSIGNMENT. The Contractor may not assign this Agreement without the written consent of the Owner, which the Owner may withhold in its sole discretion.

6.3 LAW AND JURISDICTION. All questions regarding the validity, intention, or meaning of this Agreement or any modifications of it relating to the rights and obligation of the parties will be construed and resolved under the laws of the State of Ohio. Any suit, which may be brought to enforce any provision of this Agreement or any remedy with respect hereto, shall be brought in the Common Pleas Court of the county in which the Project is located and each party hereby expressly consents to the exclusive jurisdiction of such court to the exclusion of any other court, including any U.S. District Court or any other federal court.

6.4 CONSTRUCTION. The parties acknowledge that each party has reviewed this Agreement and the other Contract Documents and entered into this Agreement as a free and voluntary act. Accordingly, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party will not be employed in the interpretation of this Agreement, the other Contract Documents, or any amendments or exhibits to it or them.

6.5 APPROVALS. Except as expressly provided herein, the approvals and determinations of the Owner and Engineer will be subject to the sole discretion of the respective party and be valid and binding on the Contractor, provided only that they be made in good faith, i.e., honestly. If the Contractor challenges any such approval or determination, the Contractor has the burden of proving that it was not made in good faith by clear and convincing evidence.

6.6 PARTIAL INVALIDITY. If any term or provision of this Agreement is found to be illegal, unenforceable, or in violation of any laws, statutes, ordinances, or regulations of any public authority having jurisdiction, then, notwithstanding such term or provision, this Agreement will remain in full force and effect and such term will be deemed stricken; provided this Agreement will be interpreted, when possible, so as to reflect the intentions of the parties as indicated by any such stricken term or provision.

6.7 COMPLIANCE WITH LAWS AND REGULATIONS. The Contractor, at its expense, will comply with all applicable federal, state, and local laws, rules, and regulations applicable to the Work, including but not limited to Chapter 4115 of the Ohio Revised Code and Sections 153.59 and 153.60 of the Ohio Revised Code, which prohibit discrimination in the hiring and treatment of employees, with respect to which the Contractor agrees to comply and to require its subcontractors to comply.

6.7.1 NON-DISCRIMINATION. Contractor agrees:

.1 That in the hiring of employees for the performance of Work under this Agreement or in any subcontract, neither the Contractor, subcontractor, or any person acting on behalf of either of them, shall by reason of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color discriminate against any citizen

of the state in the employment of labor or workers who are qualified and available to perform the Work to which the employment relates.

.2 That neither the Contractor, subcontractor, nor any person acting on behalf of either of them shall, in any manner, discriminate against or intimidate any employee hired for the performance of Work under this Agreement on account of race, creed, sex, disability as defined in Section 4112.01 of the Ohio Revised Code, or color.

.3 That there shall be deducted from the amount payable to the Contractor by the Owner under this Agreement a forfeiture of twenty-five dollars ($25.00) as required by Ohio Revised Code Section 153.60 for each person who is discriminated against or intimidated in violation of this Agreement.

.4 That this Agreement may be canceled or terminated by the Owner and all money to become due hereunder may be forfeited for a second or subsequent violation of the terms of this section of this Agreement.

6.7.2 **PREVAILING WAGE RATES.** The Contractor and its subcontractors, regardless of tier, shall strictly comply with their obligation, if any, to pay their employees working on the Project site at the applicable prevailing wage rates for the type of work, including any changes thereto, pursuant to Ohio Revised Code Chapter 4115.

6.7.3 **ETHICS.** By signing and entering into this agreement with the Owner, the Contractor represents that it is familiar with all applicable ethics law requirements, including without limitation Sections 102.04 and 3517.13 of the Ohio Revised Code, and certifies that it is in compliance with such requirements. The Contractor understands that failure to comply with the ethics laws is, in itself, grounds for termination of this contract and may result in the loss of other contracts with the Owner.

6.8 **JOB MEETINGS.** The Contractor or one of its representatives with authority to bind the Contractor will attend all job meetings. The Owner anticipates that job meetings will be scheduled on a weekly basis during construction or as needed. The Contractor will ensure that its Subcontractors also hold regular job meetings at which safety issues and job matters are discussed as these relate to the Work being performed. Job meetings include, but are not limited to, pre-construction meetings, weekly job meetings, weekly safety tool box meetings, and monthly safety meetings.

6.9 **PROPERTY TAX AFFIDAVIT.** The Contractor's affidavit given under Section 5719.024, Ohio Revised Code, is incorporated herein.

6.10 **WARRANTIES.** Notwithstanding anything to the contrary in the Contract Documents, including the Project Manual and Specifications, no warranties by Contractor shall be limited to any time shorter than the statute of limitations for written contracts in Ohio.

6.11 **CONTRACTOR ATTESTATIONS.**

.1 Contractor attests that it has not scaled these contract documents to determine quantities for bids, as Contractor has field verified and taken its own dimensions to determine the quantities for its bid.

.2 Contractor agrees that all the scales noted on the drawings are correct; so as to give it an "intent" of what is to be bid. Contractor has not relied on any other dimensions than what are noted in text and dimension lines.

.3 Contractor has thoroughly read the Contract Documents and has asked any and all questions it has on the intent of the scope of work, or supposed errors and omissions contained in these drawings, during the bid process and prior to signing this Agreement.

.4 Contractor will not be asserting a claim for additional time or money associated with the three issues listed above.

.5 Contractor believes it has accurately interpreted the Contract Documents and has asked for clarification and received satisfactory response for all items not thoroughly addressed or

appeared to be conflicting in the Contract Documents and has found all stipulations and requirements contained in this Agreement are as stated in the bid specifications and are enforceable according to Ohio Law, including but not limited to the Owner's right of offset, and the Owner's right to assess liquidated damages for work not completed according to the milestones listed on the project schedule contained in the Contract Documents.

6.12 ENTIRE AGREEMENT. This Agreement and the other Contract Documents constitute the entire agreement among the parties with respect to their subject matter and will supersede all prior and contemporaneous, oral or written, agreements, negotiations, communications, representations, and understandings with respect to such subject matter, and no person is justified in relying on such agreements, negotiations, communications, representations, or understandings.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their properly authorized representatives and agree that this Agreement is effective as of the date first set forth above.

Owner:
The City of Canton

By: _____

Name: _____

Title: _____

Date: _____

Contractor:

By: _____

Name: _____

Title: _____

Date: _____

CERTIFICATE
(Section 5705.41, R.C.)

The undersigned, fiscal officer of the Owner, certifies that the moneys required to pay that part of the Contract Sum coming due during the current fiscal year, under the Agreement to which this Certificate is attached have been lawfully appropriated for such purpose and are in the appropriate account of the Owner, or in the process of collection to the credit of the appropriate account or fund, free from any previous encumbrances. Moneys due in excess of the Contract Sum shall require an additional and separate Fiscal Officer's Certificate.

DATED: _____

_____
Fiscal Officer

BID GUARANTY AND CONTRACT BOND

(O.R.C. § 153.571)

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned _____ _____ ("Contractor") as principal and _____ _____ as surety are hereby held and firmly bound unto the **City of Canton** as obligee in the penal sum of the dollar amount of the bid submitted by the principal to the obligee on _____ _____, 20__, to undertake the construction of the **Collection Systems Service Center Garage Addition and Administration Offices Renovation Project** ("Project"). The penal sum referred to herein shall be the dollar amount of the principal's bid to the obligee, incorporating any additive or deductive Alternates made by the principal on the date referred to above to the obligee, which are accepted by the obligee. In no case shall the penal sum exceed the amount of _____ Dollars ($_____). (If the foregoing blank is not filled in, the penal sum will be the full amount of the principal's bid, including add Alternates. Alternatively, if the blank is filled in the amount stated must not be less than the full amount of the bid including add Alternates, in dollars and cents. A percentage is not acceptable.) For the payment of the penal sum well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

Signed this _____ day of _____, 20__.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that whereas the above named principal has submitted a bid for work on the Project.

Now, therefore, if the obligee accepts the bid of the principal and the principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the principal pays to the obligee the difference not to exceed ten percent (10%) of the penalty hereof between the amount specified in the bid and such larger amount for which the obligee may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the principal pays to the obligee the difference not-to-exceed ten percent (10%) of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract documents, required advertising, and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; if the obligee accepts the bid of the principal and the principal within ten (10) days after the awarding of the contract enters into a proper contract in accordance with the bid, plans, details, specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein.

Now also, if the said principal shall well and faithfully do and perform the things agreed by said principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; and surety shall indemnify the obligee against all damage suffered by failure of the principal to perform the contract according to its provisions and in accordance with the plans, details, specifications, and bills of material therefor and to pay all lawful claims of subcontractors, materialmen, and laborers for labor performed or material furnished in carrying forward, performing, or completing the contract and surety further agrees and assents that this undertaking is for the benefit of any subcontractor, materialman, or laborer having a just claim, as well as for the obligee; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions in or to the terms of the said contract or in or to the plans or specifications therefore shall in any wise affect the

obligations of said surety on its bond, and does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the work or to the specifications.

Signed and sealed this _____ day of _____, 20__.

_____
PRINCIPAL

By: _____

Printed Name & Title: _____

_____
SURETY

By: _____

Printed Name & Title: _____

_____

Surety's Address: _____

_____

Surety's Telephone Number: _____

Surety's Fax Number: _____

_____
SURETY'S AGENT

Surety's Agent's Address: _____

_____

Surety's Agent's Telephone Number: _____

Surety's Agent's Fax Number: _____

NOTE: The Contract Bond form that follows is to be used ONLY by a bidder that is awarded a contract <u>and</u> submits a form of bid guaranty other than the combined Bid Guaranty and Contract Bond with its bid. If a bidder submits a combined Bid Guaranty and Contract Bond, then the bid guaranty becomes the contract bond when the contract is awarded.

AIA and EJCDC Bid Bond or Payment and Performance Bond forms are not acceptable for this Project.

The City of Canton

CONTRACT BOND
(O.R.C. § 153.57)

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned ("Contractor"), as principal, and _____, as surety, are hereby held and firmly bound unto the **City of Canton** ("Owner") as oblige, in the penal sum of _____ _____ Dollars ($_____ _____), for the payment of which well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH that whereas, the above-named principal did on the _____ day of _____, 20__, enter into a contract with the Owner for construction of the **Collection Systems Service Center Garage Addition and Administration Offices Renovation Project** ("Project"), which said contract is made a part of this bond the same as though set forth herein:

Now, if the said Contractor shall well and faithfully do and perform the things agreed by the Contractor to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said surety hereby stipulates and agrees that no modifications, omissions, or additions in or to the terms of the said contract or in or to the plans or specifications therefore shall in any wise affect the obligations of said surety on its bond, and does hereby waive notice of any such modifications, omissions or additions to the terms of the contract or to the work or to the specifications.

Signed and sealed this _____ day of _____, 20__.

_____
(PRINCIPAL)

By: _____

Printed Name & Title:_____

_____

_____
(SURETY)

By: _____

Printed Name & Title:_____

_____

Surety's Address: _____

_____

Surety's Telephone Number:_____

Surety's Fax Number:_____

_____
NAME OF SURETY'S AGENT

Surety's Agent's Address: _____

_____

Surety's Agent's Telephone Number:_____

Surety's Agent's Fax Number:_____

BID FORM

1.01 BID SUBMITTED BY:

_____
(Contractor)

Date bid submitted: _____

1.02 DELIVER TO:

The City of Canton
ATTN: **Purchasing/Bids**
218 Cleveland Avenue SW
Canton, OH 44702

1.03 Having carefully reviewed the Instructions to Bidders, Drawings, Specifications and other Contract Documents for the Project titled **Collection Systems Service Center Garage Addition and Administration Offices Renovation Project** including having also received, read, and taken into account the following Addenda:

Addendum No.	Dated
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

and likewise having inspected the site and the conditions affecting and governing the Project, the undersigned hereby proposes to furnish all materials and to perform all labor, as specified and described in the said Specifications and/or as shown on the said Drawings for all Work necessary to complete the Project on a timely basis and in accordance with the Contract Documents regardless of whether expressly provided for in such Specifications and Drawings.

1.04 Before completing the Bid Form, the undersigned represents that it has carefully reviewed the Legal Notice to Bidders, Instructions to Bidders, this Bid Form, Form of Bid Guaranty and Contract Bond, Contractor's Affidavit (O.R.C. 5719.042), Owner-Contractor Agreement, General Conditions of the Contract (EJCDC C-700) (as modified for the Project), Drawings, Project Specifications, and other Contract Documents. Failure to comply with provisions of the Contract Documents may be cause for disqualification of the bid.

1.05 BONDS AND CONTRACT: If the undersigned is notified of bid acceptance, it agrees to furnish required bonds as indicated in the Instructions to Bidders.

1.06 COMPLETION OF WORK: In submitting a bid, the undersigned agrees to execute the Owner-Contractor Agreement in the form included in the Contract Documents and to complete its Work as required by the Contract Documents.

NOTE A: The wording of the Bid Form shall be used throughout, without change, alteration, or addition. Any change may cause it to be rejected.

NOTE B: Bidder is cautioned to bid only on the Brands or Standards specified.

NOTE C: If there is an inconsistency or conflict in the Bid amount, the lowest amount shall control, whether expressed in numbers or words.

2.01 BID:

Include the cost of all labor and material for the contract listed below. Bidder is to fill in all blanks related to the Bid Package for which a bid is being submitted. If no bid is submitted for an item, leave the item blank or insert "NO BID" in the blank. For alternate items, indicate whether the amount stated is in addition to or a deduction from the base bid amount (if there is no indication whether the amount for an alternate is an addition or a deduction, the amount shall be a deduction).

2.02 Bidder will complete the Work in accordance with the Contract Documents for the prices set forth in the attached Bid Schedule.

3.01 INSTRUCTIONS FOR SIGNING

A. The person signing for a sole proprietorship must be the sole proprietor or his authorized representative. The name of the sole proprietor must be shown below.

B. The person signing for a partnership must be a partner or his authorized representative.

C. The person signing for a corporation must be the president, vice president or other authorized representative; or he must show authority, by affidavit, to bind the corporation.

D. The person signing for some other legal entity must show his authority, by affidavit, to bind the legal entity.

4.01 BIDDER CERTIFICATIONS. The Bidder hereby acknowledges that the following representations in this bid are material and not mere recitals:

1. **The Bidder acknowledges that this is a public project involving public funds, and that the Owner expects and requires that each successful Bidder adhere to the highest ethical and performance standards. The Bidder by submitting its bid pledges and agrees that (a) it will act at all times with absolute integrity and truthfulness in its dealings with the Owner and the Design Professional, (b) it will use its best efforts to cooperate with the Owner and the Design Professional and all other Contractors on the Project and at all times will act with professionalism and dignity in its dealings with the Owner, Design Professional and other Contractors, (c) it will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her, and (d) it has read, understands and will comply with the terms of the Contract Documents.**

2. The Bidder represents that it has had a competent person carefully and diligently review each part of the Contract Documents, including any Divisions of the Specifications and parts of the Drawings that are not directly applicable to the Work on which the Bidder is submitting its bid. By submitting its bid, each Bidder represents and agrees, based upon its careful and diligent review of the Contract Documents, that it is not aware of any conflicts, inconsistencies, errors or omissions in the Contract Documents for which it has not notified the Owner in writing at least ten (10) days prior to the bid opening. If there are any such conflicts, inconsistencies, errors or omissions in the Contract Documents, the Bidder (i) will provide the labor, equipment or materials of the better quality or greater quantity of Work; and/or (ii) will comply with the more stringent requirements. The Bidder will not be entitled to any additional compensation for any conflicts, inconsistencies, errors or omissions that would have been discovered by such careful and diligent review, unless it has given such prior written notice to Owner.

3. The Bidder represents that it has had a competent person carefully and diligently inspect and examine the entire site for the Project and the surrounding area, including all parts of the site applicable to the Work for which it is submitting its bid, and carefully correlate the results of the inspection with the requirements of the Contract Documents. The Bidder agrees that its bid shall include all costs attributable to site and surrounding area conditions that would have been

discovered by such careful and diligent inspection and examination of the site and the surrounding area, and the Bidder shall not be entitled to any Change Order, additional compensation, or additional time on account of conditions that could have been discovered by such an investigation.

4. The Bidder represents, understands and agrees that a) the Claim procedures in the General Conditions as modified for the Project are material terms of the Contract Documents, b) if it has a Claim, it will have its personnel provide complete and accurate information to complete and submit the Statement of Claim form on a timely basis, c) the proper completion and timely submission of a Statement of Claim form is a condition precedent to any change in the Contract Sum or the Contract Time(s), and d) the proper and timely submission of the Statement of Claim form provides the Owner with necessary information so that the Owner may investigate the Claim and mitigate its damages.

5. The Bidder represents that the bid contains the name of every person interested therein and is based upon the Standards specified by the Contract Documents.

6. The Bidder and each person signing on behalf of the Bidder certifies, and in the case of a bid by joint venture, each member thereof certifies as to such member's entity, under penalty of perjury, that to the best of the undersigned's knowledge and belief: (a) the Base Bid, any Unit Prices and any Alternate bid in the bid have been arrived at independently without collusion, consultation, communication or agreement, or for the purpose of restricting competition as to any matter relating to such Base Bid, Unit Prices or Alternate bid with any other Bidder; (b) unless otherwise required by law, the Base Bid, any Unit Prices and any Alternate bid in the bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other Bidder who would have any interest in the Base Bid, Unit Prices or Alternate bid; (c) no attempt has been made or will be made by the Bidder to induce any other Person to submit or not to submit a bid for the purpose of restricting competition; and (d) the statements made in this Bid Form are true and correct.

7. The Bidder will execute the form of Owner/Contractor Agreement in the form included with the Contract Documents, if a Contract is awarded on the basis of this bid, and if the Bidder does not execute the Contract Form for any reason, other than as authorized by law, the Bidder and the Bidder's Surety are liable to the Owner.

8. The Bidder certifies that the upon the award of a Contract, the Contractor will ensure that all of the Contractor's employees, while working on the Project site, will not purchase, transfer, use or possess illegal drugs or alcohol or abuse prescription drugs in any way.

9. The Bidder agrees to furnish any information requested by the Owner's authorized representative to evaluate that the Bidder has submitted the lowest and best bid and that the bid is responsive to the specifications.

10. The Bidder certifies that it has no unresolved findings for recovery issued by the Auditor of State.

11. The Bidder certifies that it is aware of and in compliance with the requirements of Ohio Revised Code Section 3517.13 regarding campaign contributions.

LEGAL NAME OF BIDDER: _____

BIDDER IS (check one): __ sole proprietor __ partnership __ corporation __ other legal entity

NAME & TITLE OF PERSON LEGALLY AUTHORIZED TO BIND BIDDER TO A CONTRACT:

_____
Name Title

DATE SIGNED: _____

SIGNATURE: _____

ADDRESS: _____

_____

TELEPHONE: _____

FAX: _____

FEDERAL TAX I.D. # _____

When the Bidder is a partnership or a joint venture, state name and address of each partner in the partnership or participant in the joint venture below:

_____ _____

_____ _____
Name

_____
Address

_____ _____

_____ _____
Name

_____
Address

_____ _____

_____ _____
Name

_____
Address

_____ _____

_____ _____
Name

_____
Address

_____ _____

_____ _____
Name

_____
Address

END OF SECTION

The City of Canton

CONTRACTOR'S QUALIFICATION STATEMENT

Collection Systems Service Center Garage Addition and Administration Offices Renovation Project

SUBMITTED TO: The City of Canton
ATTN: **Purchasing/Bids**
218 Cleveland Avenue SW
Canton, OH 44702

SUBMITTED BY: _____

NAME: _____

ADDRESS: _____
_____
_____

PRINCIPAL OFFICE: _____
_____

☐ Corporation

☐ Partnership

☐ Individual

☐ Joint Venture

☐ Other

NAME OF PROJECT: **Collection Systems Service Center Garage Addition and Administration Offices Renovation** Project

1. ORGANIZATION

1.1 How many years has your organization been in business as a Contractor in the construction industry?

1.2 How many years has your organization been in business under its present business name?

1.2.1 Under what other or former names has your organization operated?

1.3 If your organization is a corporation, answer the following:

1.3.1 Date of incorporation:

1.3.2 State of incorporation:

1.3.3 President's name:

1.3.4 Vice President's name(s):

1.3.5 Secretary's name:

1.3.6 Treasurer's name:

1.4 If your organization is a partnership, answer the following:

1.4.1 Date of organization:

1.4.2 Type of partnership (if applicable):

1.4.3 Name(s) of general partner(s):

1.5 If your organization is individually owned, answer the following:

1.5.1 Date of organization:

1.5.2 Name of owner:

1.6 If the form of your organization is other than those listed above, describe it and name the principals:

2. LICENSING

2.1. List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

2.2. List jurisdictions in which your organization's partnership or trade name is filed.

2.3. List any suspension or revocations of any professional license of any director, officer, owner, or managerial employees of the Contractor, to the extent that any work to be performed on this Project is within the field of such licensed profession.

3. EXPERIENCE

3.1. List the categories of work that your organization normally performs with its own forces.

3.2. Claims and Lawsuits (If the answer to any of the questions below is yes, please attach details.)

3.2.1. Has your organization ever failed to complete any work?

3.2.2. Has your organization ever failed to complete any work by the substantial completion date, final completion date, or in a timely manner?

3.2.3. Within the last five (5) years has your organization or any of its officers prosecuted any Claims, had any Claims prosecuted against it or them, or been involved in or is currently involved in any mediation or arbitration proceedings or lawsuits related to any construction project, or has any judgments or awards outstanding against it or them? Has your organization had any extension requests, fines and penalties imposed, or contract defaults? If the answer is yes, please attach the details for each Claim, including the names and telephone numbers of the persons who are parties, the amount of the Claim, the type of Claim and the basis for the Claim, and the outcome.

Note: As used in this document "Claim" means a Claim initiated under the Contract Documents for a project or relating to the Work for a project, including Claims made against performance bonds secured by the Contractor on other construction projects.

3.3. Has your organization ever failed to comply with federal, state, and local laws, rules, and regulations, including but not limited to the Occupational Safety and Health Act, the Ohio Prevailing Wage laws, and Ohio ethics laws? If the answer is yes, please attach details and reason(s) for each instance and the outcome including any fines or penalties imposed.

3.4. Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction

contract? If the answer is yes, please attach details for each instance, including the names and telephone numbers of the persons who are parties to the contract, and the reason(s) the contract was not completed.

3.5. On a separate sheet, list construction projects your organization has in progress with an original Contract Sum of more than $10,000,000, giving the name of project, owner and its telephone number, design professional and its telephone number, contract amount, percent complete and scheduled completion date.

3.5.1. State total amount of work in progress and under contract:

3.6. Provide the following information for each contract your organization has had during the last five (5) years, including current contracts, where the Contract Sum is fifty percent (50%) or more of the bid amount for this Project, including add alternates. Include details regarding timeliness of performance and quality of work. List the original contract price for each project, the amount of any change orders or cost overruns on each, the reasons for the change orders or cost overruns, and your organization's record for complying with and meeting completion deadlines on construction projects. If there are more than ten (10) of these contracts, only provide information on the most recent ten (10) contracts, including current contracts.

Project And Work	Contract Sum	Owner's Representative & Telephone Number	Engineer's Or Architect's Representative Name & Telephone Number	Additional Comments

3.7. Provide the following information for each project your organization has had during the last five (5) years, which your organization believes is of comparable or greater size and complexity than the Owner's project. Include details regarding how such projects demonstrate your organization's ability and capacity to perform a substantial portion of the Project with its own work force. If there are more than five (5) of these projects, only provide information on the most recent five (5) projects, including current projects.

Project And Work	Contract Sum	Owner's Representative & Telephone Number	Engineer's Or Architect's Representative Name & Telephone Number	Additional Comments

3.7.1. State average annual amount of construction work your organization has performed during the last five years.

3.7.2. If any of the following members of your organization's management -- president, chairman of the board, or any director -- operates or has operated another construction company during the last five (5) years, identify the member of management and the name of the construction company.

3.7.3. If your organization is operating under a trade name registration with the Secretary of State for the State of Ohio, identify the entity for which the trade name is registered. If none, state "none."

3.7.4. If your organization is a division or wholly-owned subsidiary of another entity or has another relationship with another entity, identify the entity of which it is a division or wholly-owned subsidiary or with which it has another relationship and also identify the nature of the relationship. If none, state "not applicable."

3.8. On a separate sheet, list the construction education, training, construction experience, and tenure with your organization for each person who will fill a management role on the Project, including without limitation the Project Executive, Project Engineer, Project Manager, and Project Superintendent. For each person listed, include with the other information the last three projects on which the person worked and the name and telephone number of the Design Professional and the Owner.

3.9. Describe the size and experience of your organization's work force and your equipment and facilities, in relation to your organization's ability to complete the Project successfully and on time.

4. REFERENCES

4.1. Trade References:

4.2. Bank References:

4.3. Surety:

4.3.1. Name of bonding company:

4.3.2. Name and address of agent:

5. FINANCING

5.1 Financial Statement **(May be required, but only post-bid. Not a requirement to provide with bid.)**

5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes); and

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

5.1.2 Name and address of firm preparing attached financial statement, and date thereof.

5.1.3 Is the attached financial statement for the identical organization named on page one?

5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

5.3 Attach additional documentation or explanations demonstrating your organization's financial responsibility, adequate resources and availability of credit, its means and ability to procure insurance and acceptable performance bonds required for the Project.

6. Does your organization participate in a drug-free workplace program? Provide your organization's record for both resolved and unresolved findings of the Auditor of the State of Ohio for recovery as defined in Section 9.24 of the Ohio Revised Code.

7. List any projects within the previous five years where a public entity determined that your organization was not a responsible bidder, including the name of the public entity, the reasons given by the public entity, and an explanation thereof.

8. Additional Criteria. Pursuant to the Codified Ordinance of the City of Canton, Chapter 105, the Owner, in its discretion, reserves the right to request additional information and documentation relating to the foregoing and related to any of the criteria listed in Paragraph I.6 of the Instructions to Bidders from Bidders after the bid opening. The Owner may consider such information and documentation in determining which bid is lowest and best. The Owner, in its discretion, may consider and give such weight to any and all criteria as it deems appropriate.

[left intentionally blank]

Certification. The undersigned certifies for the reliance of the Owner that after diligent investigation, to the best of the undersigned's belief, the information provided with this Contractor's Qualification Statement is true, accurate and not misleading.

SIGNATURE:

Dated this _____ day of _____ 20____.

Name of Organization: _____

By: _____
[print name]

Signature: _____

Title: _____

State of _____

County of _____

_____, being duly sworn, deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this _____ day of _____ 20__.

_____
Notary Public

My Commission Expires:_____

SEAL

Modified General Conditions (EJCDC)

Please go to this link for the document or enter the following link information into a web browser:

https://cantonohio.gov/DocumentCenter/View/596/Modified-Standard-General-Conditions-of-the-Construction-Contract---3rd-Party-Engineer

City of Canton Codified Ordinances

Bidders shall take notice that they are to comply with the Codified Ordinances of the City of Canton, including but not limited to, the following:

1. **Chapter 105.02 – Public Paving Time Restrictions.**
   All City public paving contracts shall include a provision for liquidated damages in order to provide the City reasonable compensation for actual damages due to a failure to ensure that asphalt paving take place on the City's road surfaces from May 1st to October 1st; and/or during optimal climatic conditions that are conducive to the best mix compacting and long term durability of the pavement, according to the highest and best practices of the asphalt paving industry.
   (Ord. 270-2014. Passed 12-29-14.)

2. **Chapter 105.03 – U.S. Steel Usage Required; Exception.**
   All City contracts shall stipulate or provide that all steel necessary in the construction of any work performed under such contracts shall be steel that is produced in the United States unless a specific product which is required is not produced by manufacturers in the United States in which event this prohibition does not apply. This section shall apply to only contracts awarded by the Board of Control of the City.
   (Ord. 224-77. Passed 6-27-77.)

3. **Chapter 105.05 – Materials to be Purchased Locally.**
   In all future contracts for the construction of buildings, structures, or other improvements under the Capital Improvement Budget, the following clause shall be printed or typewritten on each contract:
   It is the desire of the City of Canton that all materials used in the construction covered by this contract shall be purchased in the Canton area except such materials which are unavailable in the Canton area.
   (Res. 49-77. Passed 2-7-77.)

4. **Chapter 105.06 – Minority Contract Provision.**
   a. All contracts with the City shall include the following clause:
   The bidder agrees to expend at least $_____of the Contract in the event the contract is awarded to such bidder for minority/women's business enterprises. For purposes of this pledge, the term "minority/women's business enterprise" means a bona fide business established as a sole proprietorship, partnership or corporation owned, operated and controlled by one or more minority persons or women who have at least fifty-one percent (51%) ownership. "Minority" includes African Americans, Asian/Pacific Islanders, Hispanic/Latino Americans and Native American Indians. The minority or woman must have operational and managerial control, interest in capital, and earnings commensurate with the percentage of ownership. Minority/women's business enterprises may be employed as construction contractors, subcontractors, vendors or suppliers.
   (Ord.185-2011. Passed 10-31-11.)

5. **Chapter 105.12 – Local Bidder Preference.**
   a. The Board of Control, in determining the lowest and best bidder in the award of contracts to which this section is applicable, is authorized to award contracts to local bidders as hereinafter defined, whose bid is not more than five percent (5%) higher, subject to a maximum amount of twenty thousand dollars ($20,000.00), than the lowest dollar bid submitted by non-local bidders. The Board of Control's decision in making such an award shall be final.

b. For purposes of this section, "local bidder" means an individual or business entity which at the time of the award of the contract has a headquarters, division, sales office, sales outlet, manufacturing facility, or similar significant business-related location in Stark County, Ohio.

c. All contract specifications and/or bid documents that are distributed by Canton for the purpose of soliciting bids for goods and/or services shall contain the following notice:

Prospective bidders will take notice that the City of Canton, in determining the lowest and best bidder in the award of this contract, may award a local bidder preference to any qualified bidder pursuant to Section 105.12 of the Codified Ordinances of the City of Canton. The determination of whether a bidder qualifies for the local preference shall be made by Board of Control. The Board's decision shall be final. A copy of Section 105.12 is attached.

d. This section shall be applicable to all contracts for equipment, goods, machinery, materials, supplies, vehicles and/or services, which are purchased, leased and/or constructed at a cost in excess of fifty thousand dollars ($50,000.00) and which require bidding pursuant to Ohio R.C. 735.05 through 735.09 and Ohio R.C. 737.03.

(Ord. 115-2018. Passed 5-14-18.)

6. Chapter 105.15 – City Income Tax

a. No person, partnership, corporation or unincorporated association may be awarded a contract with the City under Sections 105.09 or 105.10, unless the bidder is paid in full or is current and not otherwise delinquent in the payment of City income taxes, including any obligation to pay taxes withheld from employees under Section 182.05 and any payment on net profits under Section 182.06.

b. Falsification of any information related to or any post-contractual violation of the requirement to pay City income taxes set forth in subsection (a) shall constitute cause for the rescission of the balance of the contract at the City's discretion.

c. No partnership, corporation or unincorporated association which has as one of its partners, shareholders or owners a person who is a twenty percent (20%) or greater equity owner in such partnership, corporation or unincorporated association and who is delinquent in the payment of City income taxes as set forth in subsection (a), may be awarded a contract with the City under Sections 105.09 or 105.10.

d. A person who is a twenty percent (20%) or greater equity owner in any partnership, corporation or unincorporated association which is delinquent in the payment of City income taxes as set forth in subsection (a) may not be awarded a contract with the City under Sections 105.09 or 105.10.

e. A contract awarded under Sections 105.09 or 105.10 for a public improvement project, services other than personal or professional services, and personal or professional services shall not be binding or valid unless such contract contains the following provisions:

Said _____ hereby further agrees to withhold all City income taxes due or payable under Chapter 182 of the Codified Ordinances for wages, salaries, fees and commissions paid to its employees and further agrees that any of its subcontractors shall be required to agree to withhold any such City income taxes due for services performed under this contract. Furthermore, any person, firm or agency that has

a contract or agreement with the City shall be subject to City income tax whether a resident or nonresident in the City, and whether the work being done is in the City or out of the City. In addition to the tax withheld for employees, the net profits on the contract shall be subject to City income tax.
(Ord. 238-2015. Passed 11-30-15.)

7. Chapter 182.30 – Contract Provisions

a. No contract on behalf of the City under Sections 105.09 or 105.10 of the Codified Ordinances of Canton for a public improvement project, services other than personal or professional services, and personal or professional services shall be binding or valid unless such contract contains the following provisions:

Said _____ hereby further agrees to withhold all City income taxes due or payable under Chapter 182 of the Codified Ordinances for wages, salaries, fees and commissions paid to its employees and further agrees that any of its subcontractors shall be required to agree to withhold any such City income taxes due for services performed under this contract. Furthermore, any person, firm or agency that has a contract or agreement with the City shall be subject to City income tax whether a resident or nonresident in the City, and whether the work being done is in the City or out of the City. In addition to the tax withheld for employees, the net profits on the contract shall be subject to City income tax.

b. By entering into contract with the City of Canton _____ agrees with the City regarding the manner of withholding of City income taxes as provided in Section 718.011(F) of the Ohio Revised Code.
   i. Municipal income tax withholding provisions of Sections 718.011(B)(1) and 718.011(D) ORC shall not apply to qualifying wages paid to employees for work done or services performed or rendered inside the City or on City property.
   ii. _____ agrees to withhold income tax for the City from employees' qualifying wages earned inside the City or on City property, beginning with the first day of work done or services performed or rendered inside the City.

(Ord. 238-2015. Passed 11-30-15.)

8. Chapter 507.03 – Equal Employment Opportunity Clause.

b. During the performance of this contract, the contractor agrees as follows:
   1. The contractor shall not discriminate against any employee or applicant for employment because of race, age, handicap, religion, color, sex, national origin, sexual orientation or gender identity. The contractor shall take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to race, religion, color, sex, national origin, military status, sexual orientation or gender identity. As used herein, the word "treated" shall mean and include without limitation the following: recruited, whether by advertising or other means; compensation, whether in the form of rates or pay or other forms of compensation; selected for training, including apprenticeship; promoted; demoted; upgraded; downgraded; transferred; laid off; and terminated. The contractor agrees to and shall post in conspicuous places available to employees and applicants for employment notices to be provided by the contracting officers setting forth the provisions of this nondiscrimination clause.
   2. The contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, age, handicap, religion, color, sex, national origin, military status, sexual orientation or gender identity.

(Ord. 153-2012. Passed 9-24-12.)

3. The contractor shall send to each labor union or representative of workers, with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the contractor's commitments under the equal opportunity clause of the City; and he shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor shall submit in writing to the City his affirmative action plan, and each subcontractor and supplier of equipment or supplies shall submit to the general contractor his affirmative action plan. The responsibility for securing these affirmative action plans falls upon the general contractor and shall be on file at the office of the general contractor. The contractor shall furnish all information and reports required by the City or its representative pursuant to this chapter, and shall permit access to his books, records, and accounts by the contracting agency and by the Executive Secretary for purposes of investigation to ascertain compliance with the program.
5. The contractor shall take such action with respect to any subcontractor as the City may direct as a means of enforcing the provisions of this equal opportunity clause, including penalties and sanctions for noncompliance; provided, however, that in the event the contractor becomes involved in or is threatened with litigation as the result of such direction by the City, the City will enter into such litigation as is necessary to protect the interests of the City and to effectuate the City's equal opportunity program and, in the case of contracts receiving Federal assistance, the contractor or the City may request the United States to enter into such litigation to protect the interests of the United States.
6. The contractor shall file and shall cause his subcontractors, if any, to file compliance reports with the City in the form and to the extent prescribed by the City or its representative. Compliance reports filed at such times as directed shall contain information as to the employment practices, policies, programs and statistics of the contractor and his subcontractors.
7. The contractor shall include the provisions of this equal employment opportunity clause in every subcontract or purchase order, so that such provisions will be binding upon each subcontractor or vendor.
8. Refusal by the contractor or subcontractor to comply with any portion of this program as herein stated and described will subject the offending party to any or all of the following penalties:
   A. Withholding of all future payments under the involved public contract to the contractor in violation, until it is determined that the contractor or subcontractor is in compliance with the provisions of this contract.
   B. Refusal of all future bids for any public contract with the City or any of its departments or divisions, until such time as the contractor of subcontractor demonstrates that he has established and shall carry out the policies of the program as herein outlined.
   C. Cancellation of the public contract and declaration of forfeiture of the performance bond.
   D. In cases in which there is substantial or material violation or the threat of substantial or material violation of the compliance procedure or as may be provided by contract, appropriate proceedings may be brought to enforce these provisions, including the enjoining within applicable laws of contractors, subcontractors or other organizations, individuals or groups who prevent, directly or indirectly, or seek to prevent, directly or indirectly, compliance with the policy as herein outlined.

(Ord. 179-74. Passed 6-17-74.)

STATEMENT OF CLAIM FORM

Claim No. ___ for Contractor

1. Name of Contractor: _____

2. Date written claim given:_____.

3. Contractor's representative to contact regarding the claim:

   Name:_____ Title: _____
   Telephone No. _____ (office) FAX No. _____

   E-mail: _____

4. General description of claim:

_____
_____
_____

5. Contract Documents. If the claim is based upon any part or provision in the Contract Documents, including but not limited to pages in the Drawings and/or paragraphs in the Specifications, Owner-Contractor Agreement, General Conditions or Supplementary General Conditions, state upon which parts or provisions the claim is based:

_____
_____
_____

6. Delay claims:

   6.1 Date delay commenced: _____
   6.2 Duration of the delay: _____
   6.3 Apparent cause of the delay and part of critical path affected:

_____
_____
_____

   6.4 Impact of the delay and recommendations for minimizing such impact:

_____
_____
_____

7. Additional compensation. Set forth in detail all additional compensation to which the Contractor believes it is entitled with respect to this claim:

_____
_____
_____

8. Instructions for Completing the Statement of Claim Form ("Instructions"). The Instructions are incorporated in this Form.

9. Truth of Claim. By submitting this claim, the Contractor and its representative certify that after conscientious and thorough review and to the best of his or her knowledge and belief a) the Contractor has complied fully with the Instructions, b) the information in this State of Claim is accurate, c) the Contractor is entitled to recover the compensation in paragraph 7, and d) the Contractor has not knowingly presented a false or fraudulent claim. The Contractor by its authorized representative must acknowledge this Statement of Claim before a notary public.

CONTRACTOR: _____

By: _____

Name and Title:_____

CONTRACTOR'S ACKNOWLEDGMENT

State of _____,

County of _____, ss:

_____ first being sworn, states that after conscientious and thorough review, the statements made in attached Statement of Claim Form are complete and true to the best of his or her knowledge and belief.

_____

Sworn to before me a notary public by _____ on _____ __, 20__.

_____

Notary Public

WHEN COMPLETED, FORWARD A COPY OF THIS NOTICE AND STATEMENT OF CLAIM FORM TO THE OWNER AND ENGINEER.

INSTRUCTIONS FOR COMPLETING THE STATEMENT OF CLAIM FORM

1. Completing the Statement of Claim Form ("Claim Form") is a material term of the Contract. The Claim Form tells the Owner and Design Professional that the Contractor is making a Claim and that they need to act promptly to mitigate the effects of the occurrence giving rise to the Claim. The Claim Form also provides them with information so that they can mitigate such effects. The Contractor acknowledges that constructive knowledge of the conditions giving rise to the Claim through job meetings, correspondence, site observations, etc. is inadequate notice, because knowledge of these conditions does not tell the Owner and Engineer that the Contractor will be making a Claim and most often is incomplete.

2. If the space provided in the Claim Form is insufficient, the Contractor, as necessary to provide complete and detailed information, must attach pages to the Claim Form with the required information.

3. Paragraph 4. The Contractor must state what it wants, *i.e.*, time and/or compensation, and the reason why it is entitled to time and/or compensation.

4. Paragraph 5. The Contractor must identify the exact provisions of the Contract Documents it is relying on in making its Claim. For example, if the Claim is for a change in the scope of the Contractor's Work, the Contractor must identify the specific provisions of the Specifications, and the Plan sheets and details that provide the basis for the scope change.

5. Paragraph 6. This paragraph applies to delay claims, including delays that the Contractor believes result in constructive acceleration. The Contractor must identify the cause of the delay, party or parties responsible, and what the party did or did not do that caused the delay, *i.e.*, specific work activities. The Contractor acknowledges that general statements are not sufficient, and do not provide the Owner with sufficient information to exercise the remedies available to the Owner or to mitigate the effects of the delay.

   For example, if the Contractor claims a slow response time on submittals caused a delay, the Contractor must identify the specific submittals, all relevant dates, and then show on the applicable schedule, by circling or highlighting, the activities immediately affected by the delays. Also for example, if the Contractor claims it was delayed by another Contractor, the Contractor must identify the delaying Contractor, specifically what the delaying Contractor did or did not do that caused the delay, and then show the applicable schedule, by circling or highlighting, the activities immediately affected by the delays. Further by example, if the Contractor seeks an extension of time for unusually severe weather, the Contractor must submit comparative weather data along with a record of the actual weather at the job site and job site conditions.

6. Paragraph 6.4. Time is of the essence under the Contract Documents. If there is a delay, it is important to know what can be done to minimize the impact of the delay. It therefore is important that the Contractor provide specific recommendations on how to do so.

7. Paragraph 7. The Contractor must provide a specific and detailed breakdown of the additional compensation it seeks to recover. For future compensation, the Contractor shall provide its best estimate of such compensation.

8. Paragraph 8 and Acknowledgment. By submitting this Claim, the Contractor and its representative certify that after conscientious and thorough review and to the best of his or her knowledge and belief a) the Contractor has complied fully with the Instructions, b) the information in this Claim Form is accurate, c) the Contractor is entitled to recover the compensation in paragraph 7, and d) the

Contractor has not knowingly presented a false or fraudulent claim. The Contractor by its authorized representative must acknowledge this Statement of Claim before a notary public.

End of Instructions

CONTRACTOR'S PERSONAL PROPERTY TAX AFFIDAVIT

(O.R.C. § 5719.042)

State of Ohio
County of _____, ss:

_____, being first duly sworn, deposes and says that he is the
(Name)

_____ of _____ with offices located at
(Title) (Contractor)

_____, and as its duly
(Address of Contractor)

authorized representative, states that effective this _____ day of _____, 20___,

_____
(Name of Contractor)

( ) is charged with delinquent personal property taxes on the general list of personal property as set forth below:

County	Amount (includes total amount due, plus penalties and interest thereon)
Stark	$_____

( ) is not charged with delinquent personal property taxes on the general list of personal property in Stark County.

_____

_____
(Affiant)

Sworn to and subscribed before me by the above-named affiant this _____ day of _____, 20__.

_____
(Notary Public)

My commission expires

_____, 20__

CONTRACTOR'S FINAL WAIVER & RELEASE AFFIDAVIT
("AFFIDAVIT")

Project: **Collection Systems Service Center Garage Addition and Administration Offices Renovation**

In consideration for payment received from the City of Canton (the "City") in the amount requested in Contractor's Final Application for Payment to the City, the receipt of which is hereby acknowledged, the undersigned Contractor hereby waives and releases any rights it has or may have to any and all types of claims relating to the Project, including without limitation claims of payment, Mechanic's Lien, stop notice, equitable lien, labor and material bond, breach of contract or unjust enrichment, or any other claim against the City, for any labor, materials, or equipment the undersigned may have delivered or provided to the Project, except for any Claims the undersigned has made by properly and timely submitting a Statement of Claim form. The undersigned further certifies that this Affidavit covers claims by all contractors, subcontractors, and suppliers who may have provided any labor, material, or equipment to the Project through the undersigned or at the undersigned's request. The undersigned acknowledges that all such contractors, subcontractors, sub-subcontractors and suppliers have signed an affidavit in the form of this Affidavit releasing any and all claims against the City, except for any Claims the undersigned has made by properly and timely submitting a written statement of its Claim. The undersigned hereby represents and warrants that it has paid any and all welfare, pension, vacation or other contributions required to be paid on account of the employment by the undersigned of any laborers on the Project.

This Affidavit is for the benefit of, and may be relied upon by the City. The undersigned hereby agrees to indemnify, defend and hold harmless each of the foregoing, the Project, work of improvement, and real property from any and all claims, or liens that are or should have been released in accordance with this Affidavit.

_____
Company Name

_____
Authorized Signature (Company Officer)

_____
Title

_____
Date

State of: _____ County of _____

Subscribed and sworn to before me this _____

day of _____

Notary Public: _____

My Commission Expires: _____

CITY OF CANTON
Collection Systems Service Center Garage Addition and Administration Offices Renovation
Project

PRE-BID SUBSTITUTION FORM

1. Note. Certain brands of material or apparatus are specified. Each bid will be based on these brands, which may be referred to in the Contract Documents as Standards. The use of another brand (referred to as a substitution or proposed equal in the Contract Documents, when a bidder or the contractor seeks to have a different brand of material or apparatus than that specified approved by the Owner for use in the Project) may be requested as provided in the Instructions to Bidders. Substitutions, however, unless approved and issued in an Addendum, will not be considered in determining which bidder to award the contract to.

2. The detailed procedures for submitting substitutions are set forth in Paragraph K of the Instructions to Bidders.

Specification Section	Brand or Name Specified	Proposed Substitution

This is a sample PLA only. A PLA specific to the Collection Systems Service Center Garage Addition and Administration Offices Renovation will be provided prior to contract award.

Appendix A

PROJECT LABOR AGREEMENT
FOR THE
THURMAN MUNSON MEMORIAL STADIUM PARTIAL ROOF REPLACEMENT PROJECT
ENTERED INTO BETWEEN
CITY OF CANTON
AND
EAST CENTRAL OHIO BUILDING AND CONSTRUCTION TRADES COUNCIL AFL-CIO
AND
SIGNATORY LOCAL UNIONS

Effective _____

CONTENTS

ARTICLE I

INTENT AND DURATION

Section 1. Intent And Duration. This Project Labor Agreement (the "Agreement" or "PLA") is entered into between the City of Canton (collectively the "Owner"); the East Central Ohio Building and Construction Trades Council, AFL-CIO ("ECOB & CTC" or "Council"); and the Signatory Unions (the "Unions"), and applies exclusively to the construction work within the scope of this Agreement to be performed on the Thurman Munson Memorial Stadium Partial Roof Replacement Project (the "Project"). The purpose of this Agreement is to promote efficiency and cost-savings in the construction and refurbishment that is a part of the Project and to provide for the peaceful settlement of any and all labor disputes and grievances without strikes or lockouts, thereby promoting the public interest in assuring the timely and economical completion of the Project. This Agreement shall expire and be of no further force or effect upon the completion of the Project.

Upon execution of this Agreement by all parties, all construction, remodeling and renovation work covered by this Agreement on the Project shall be contracted exclusively to Contractors, of whatever tier, who agree to execute and be bound by the terms of this Agreement. The Unions agree that Contractors may execute the Agreement, or the Letter of Assent attached as Appendix I, for purposes of performing such work. The Owner (or its permitted designee) shall monitor compliance with this Agreement by all contractors and subcontractors. For purposes of the Agreement, the term "Contractor" shall be deemed to include all construction contractors and subcontractors of whatever tier engaged in on-site construction and renovation work on the Project. The Owner, the Unions and all signatory Contractors agree to abide by the terms and conditions contained in the Agreement. This Agreement represents the complete understanding of all parties, and no Contractor is or will be required to sign any other agreement with a signatory union as a condition of performing work coming within the scope of this Agreement. No practice, understanding or agreement between a Contractor and a Union, which conflicts with any provisions in this Agreement, will be binding on any other party unless endorsed in writing by the Owner.

Section 2. Limitation Of Agreement To Project. The Unions agree that this Agreement will be made available to, and will fully apply to, any successful bidder for

work on the Project, without regard to whether that successful bidder performs work at other sites on either a union or a non-union basis, and without regard to whether employees of such bidder are or are not members of any union. The Unions further agree that this Agreement applies only to this Project. Nothing in this agreement is intended to, or shall, interfere with, or negate, any existing contractual relationship or collective bargaining agreement between the Union and any contractor or subcontractor that may execute this Agreement.

ARTICLE II

PURPOSE

Section 1. Purpose. The Project Cost is fairly estimated to be $125,000.00. Much of the existing roof at the Thurman Munson Memorial Stadium is in a state of disrepair and must be replaced to avoid further damage to the entire facility. This Project will involve the removal of old roofing material and coverings. The old roofing material and coverings will be replaced with new EPDM roofing and will be consistent with current industry standards. The parties to this Agreement understand and acknowledge that the Project is important to the economic development of the City of Canton and to advancing the goals appearing in the City's Comprehensive Plan.

Section 2. Time Is Of The Essence. The parties to this Agreement understand and agree that time is of the essence for this Project. The parties understand and agree that timely completion of the Project will require the use of substantial numbers of employees from construction and supporting crafts possessing skills and qualifications that are essential to the Project. The Unions pledge that they have members who are competent, skilled, and qualified to perform the required construction work. The parties also understand that on-budget completion of the Project is most critical; it is therefore essential that construction work on the Project be done in an efficient, economical manner with optimum productivity and with no delays. In recognition of those special needs of the Project, the Unions signatory hereto and their members agree not to initiate, authorize, sanction, participate in or condone, or permit their members to engage in any strike, sympathy strike, jurisdictional strike, recognitional strike, slowdown, sabotage, work to rule, sickout, sit down, picketing of any type (including informational picketing), handbilling, boycott, interruption of work or any disruptive activity that interferes with or interrupts in any

way work on the Project or other operations of the City of Canton or its Water Department. Contractors agree not to engage in any lockouts.

ARTICLE III

BENEFITS OF THE AGREEMENT

Section 1. Benefits Of The Agreement. This Agreement is intended to foster the achievement of a timely and on-budget completion of the Project by, among other things:

(a) reducing and/or eliminating the tension and potential disagreements that might otherwise exist between Union and non-union workers on the Project;

(b) avoiding the costly delays of strikes, sympathy strikes, jurisdictional strikes, slowdowns, walkouts, picketing, handbilling and any other disruptions or interference with work, and promoting labor harmony and peace for the duration of the Project;

(c) standardizing terms and conditions governing the employment of labor on the Project;

(d) permitting flexibility in work scheduling and shift hours and times;

(e) achieving negotiated adjustments as to work rules and staffing requirements from those which otherwise might obtain;

(f) providing comprehensive and standardized mechanisms for the settlement of work disputes;

(g) ensuring a reliable source of skilled and experienced labor; and

(h) furthering public policy objectives, to the extent lawful, as to improved employment opportunities for minorities, women and the economically disadvantaged in the construction industry. Mindful of the economic condition and unemployment rate in Stark County, the Owner anticipates and expects that all construction workers and employees on this Project will be residents of Stark County. In view of the very technical and specialized work that is inherent in the construction industry, all parties acknowledge that this expectation by the Owner is a goal, not a mandate. To this end, all Contractors working under this Agreement pledge that they will make a good-faith effort to reach this goal expressed by the Owner.

ARTICLE IV

SCOPE OF AGREEMENT

Section 1. The Work. This Agreement is specifically defined and limited to onsite construction and renovation work required to construct the Project.

Section 2. Exclusions From Scope. Items specifically excluded from the scope of this Agreement, even if performed in connection with the Project, include the following:

(a) Work of non-manual employees, including but not limited to, superintendents, supervisors, staff engineers, inspectors, quality control and quality assurance personnel, timekeepers, mail carriers, clerks, office workers, including messengers, guards, safety personnel, emergency medical and first aid technicians, and other professional, engineering, administrative, supervisory and management employees.

(b) Equipment and machinery owned or controlled and operated by the Owner.

(c) All off-site manufacture, fabrication or handling of materials, equipment or machinery (except at dedicated lay-down or storage areas and except as provided in Article IV, Section 9), and all deliveries of any type to and from the Project site (except on-site pouring of concrete).

(d) All employees of the Owner, the Construction Supervisor, design team or any environmental, engineering or other consultant when such employees do not perform labor coming within the scope of this Agreement.

(e) Any work performed on or near or leading to or onto the site of work on the Project and undertaken by state, county, city or other governmental bodies, or their contractors; or by public utilities or their contractors.

(f) Off-site maintenance of leased equipment and on-site supervision of all such maintenance work.

(g) Work by employees of a manufacturer or vendor necessary to maintain such manufacturer's or vendor's warranty or guarantee, or work performed by supervisors or technicians employed by the manufacturer or vendor to oversee the testing of equipment once installed to insure that

the equipment is fully operational.

(h) Laboratory work for specialty testing or inspections not ordinarily done by the signatory local unions.

(i) All work done by employees of any State agency, authority or entity or employees of any municipality or other public employer.

(j) This Agreement does not apply to work covered under a collective bargaining agreement between a contractor and a local union in the outside line branch of the International Brotherhood of Electrical Workers, including, but not limited to, construction of electrical transmission and distribution lines (including above-ground and below-ground lines), catenary and trolley facilities, switch yards, and substations.

The Unions agree that there shall be no interference with or disruption of work, of those contractors, employers, and employees exempted from coverage of this Agreement by subparagraph (a) through (i) above.

Section 3. Contract Award and Consent to Agreement.

(a) The Owner, and/or Contractors, as appropriate, have the absolute right to award contracts or subcontracts on the Project notwithstanding the existence or nonexistence of any agreements between such Contractor and any Union party provided only that such Contractor is willing, ready and able to execute and comply with this Agreement or a Letter of Assent thereto, should such Contractor be awarded work covered by this Agreement.

(b) All subcontractors of a Contractor, of whatever tier, who have been awarded contracts of work covered by this Agreement, on or after the effective date of this Agreement, shall also be required to accept and to be bound by the terms and conditions of this Agreement, and shall evidence their acceptance by the execution of this Agreement or a Letter of Assent thereto, prior to the commencement of work. A copy of this Agreement or Letter of Assent executed by each Contractor shall be immediately provided to the Union upon execution.

Section 4. Stand-Alone Agreement. This Agreement is a stand-alone

Agreement. While this Agreement expressly does not incorporate any local area collective bargaining agreements, such local area collective bargaining agreements may be referenced for the limited purposes as hereinafter set forth in this Agreement. However, to the extent, if any, that any provisions of this Agreement conflict with any provision of a local area collective bargaining agreement, the provisions of this Agreement shall control, except for all work performed under the NTL Articles of Agreement, the National Stack/Chimney Agreement, the National Cooling Tower Agreement, all instrument calibration work and loop checking shall be performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians, and the National Agreement of the International Union of Elevator Constructors, with the exception of Articles VII, VIII and X of this Agreement, which shall apply to such work.

Section 5. Craft Jurisdiction. This Agreement shall recognize the traditional craft jurisdictions of the signatory unions. Any and all jurisdictional disputes shall be settled in accordance with Article VIII below. While this Agreement is a stand-alone Agreement, the Agreement will utilize the local area collective bargaining agreements of signatory locals, not state-wide agreements or other special project agreements, as a reference to define the signatory local unions' craft jurisdiction.

Section 6. Subcontracting. The Owner agrees that neither it nor any of its contractors or subcontractors will subcontract any work covered by this Agreement to be done on the Project except to a person, firm or corporation who is or agrees to become party to this Agreement. Any contractor or subcontractor working on the Project shall, as a condition to working on said Project, become signatory to and perform all work under the terms of this Agreement. Contractors who are signatory to local are collective bargaining agreements shall be bound by the terms of their respective local collective bargaining agreements on subcontracting to the extent such terms are consistent with Article IV, Section 2 of this Agreement. Disputes concerning compliance with such local subcontracting provisions for this Project shall be subject to all of the dispute resolution provisions of this Agreement.

Section 7. Liability. It is understood that the liability of the Contractor and the liability of the separate Unions under this Agreement shall be several and not joint. The Unions agree that this Agreement does not have the effect of creating any joint

employer status between or among the Owner, Construction Supervisor and/or any Contractor, and neither the Owner nor Construction Supervisor shall assume any liabilities of the Contractors.

Section 8. Abatement of Agreement. As areas of covered work on the Project are accepted by the Owner, this Agreement shall have no further force or effect on such areas except where the Contractor is directed by the Owner to engage in repairs or punch list modifications.

Section 9. Miscellaneous. Notwithstanding any other provision of this Agreement, this Agreement applies and is limited to the recognized and accepted historical definition of demolition and new construction work under the direction of and performed by the contractor(s), of whatever tier, who have contracts awarded for such work on the project. Such work shall include site preparation work and dedicated off-site work except for the contractors and subcontractors specifically excluded in this Article II. Any off-site prefabrication of any building materials, systems and/or components traditionally performed on site shall be performed by the appropriate craft signatory to this Agreement and approved by the owner.

ARTICLE V

LABOR/MANAGEMENT COOPERATION

JOINT ADMINISTRATIVE COMMITTEE

Section 1. The parties to this Agreement shall establish a Project Joint Administrative Committee ("Committee"). This Committee will be a two-person committee comprised of one member each appointed by the Owner (or its designee) and the Unions, with an alternate appointee Union member available to replace the regular appointee when a problem or grievance concerns the regular appointee's Union. Each member of the Committee shall designate an alternate who shall serve in the absence of the member for any purpose contemplated by this Agreement.

Section 2. The Committee shall meet at least quarterly, or more often if special circumstances warrant, to discuss the administration of the Agreement, the progress of the Project, labor/management problems that may arise, and any other relevant matters. Any need for interpretation which might arise from the application of the terms and conditions of the Agreement shall be referred directly to the Committee for resolution.

ARTICLE VI

UNION RECOGNITION AND EMPLOYMENT

Section 1. Pre-Hire Recognition. Each Contractor and subcontractor recognizes the Unions as the sole and exclusive bargaining representatives of all craft and trade employees within their respective jurisdictions working on the Project under the Agreement.

Section 2. Contractor's Right of Selection. Each Contractor shall have the right to determine the competency of all employees, the number of employees required and shall have the sole responsibility for selecting employees to be laid off. To the extent any training or vendor education is required to fill any position, said training shall be undertaken at no cost or expense to Owner.

Section 3. Union Referral. For local Unions having a job referral system, each Contractor agrees to comply with such system, and the referral system shall be used exclusively by such Contractor, except as modified by this Article. Such job referral system will be operated in a non-discriminatory manner and in full compliance with Federal, state, and local laws and regulations requiring equal employment opportunities and nondiscrimination, and referrals shall not be affected in any way by the rules, regulations, bylaws, constitutional provisions or any other aspects or obligations of union membership, policies or requirements. The Union shall indemnify and hold each Contractor harmless with respect to any claim arising out of how the Union operates and administers its referral system. All hiring procedures, including related practices affecting apprenticeship and training, will be operated so as to facilitate the ability of the contractors to meet any and all equal employment opportunity/affirmative action obligations. The Contractor may reject any referral and request another, different referral; provided, however, the Contractor shall furnish, upon request from the Union, a written explanation for the rejection.

Section 4. Lack of Job Referral System. In the event that a signatory Local Union does not have a job referral system as set forth in Section 3 above, the Contractor shall give the Union a forty-eight (48) hour opportunity to refer applicants. The Contractor shall notify the Union of employees hired from any source other than referral by the Union.

Section 5. Unavailability of Union Referrals. In the event that local Unions

are unable to fill any requisitions for qualified employees within forty-eight hours (48) after such requisition is made by the Contractor (Saturdays, Sundays, and Holidays excepted), the Contractor may employ applicants from any other available source. The Contractor shall inform the Union of the name, address and telephone number of any applicants hired from other sources and refer the applicant for the Local Union for dispatch to the Project.

Section 6. Union Best Efforts. The Local Unions will exert their utmost efforts to recruit sufficient numbers of skilled craft workers to fulfill the manpower requirements of each Contractor, including calls to local unions in other geographic areas when its referral lists have been exhausted. The parties to this Agreement support the development of increased numbers of skilled construction workers from the residents of the area of the Project. Toward that end, the Unions agree to encourage the referral and utilization, to the extent permitted by law and the hiring hall procedures, of qualified residents as journeymen, apprentices and trainees on the Project.

ARTICLE VII

GRIEVANCE ARBITRATION PROCEDURE

Section 1. This Agreement is intended to provide close cooperation between management and labor. Each of the Unions will assign a representative to this Project for the purpose of completing the construction of the Project economically, efficiently, continuously, and without interruptions, delays, or work stoppages.

Section 2. The Contractors, Unions, and the employees, collectively and individually, realize the importance to all parties to maintain continuous and uninterrupted performance of the work of the Project, and agree to resolve disputes in accordance with the grievance-arbitration provisions set forth in this Article.

Section 3. Any question or dispute arising out of and during the term of this Agreement (other than trade jurisdictional disputes) shall be considered a grievance and subject to resolution under the following procedures:

> **Step 1.** (a) When any employee subject to the provisions of this Agreement feels he or she is aggrieved by a violation of this Agreement, he or she, through his or her local union business representative or job steward, shall, within five (5) working days after the occurrence of the violation, give notice

to the work-site representative of the involved Contractor stating the provision(s) alleged to have been violated. The business representative of the local union or the job steward and the work-site representative of the involved Contractor shall meet and endeavor to adjust the matter within three (3) working days after timely notice has been given. The representative of the Contractor shall keep the meeting minutes and shall respond to the Union representative in writing at the conclusion of the meeting but not later than twenty-four (24) hours thereafter. If they fail to resolve the matter within the prescribed period, the Local Union may, within forty-eight (48) hours thereafter, pursue Step 2 of the Grievance Procedure, provided the grievance is reduced to writing, setting forth the relevant information concerning the alleged grievance, including a short description hereof, the date on which the grievance occurred, and the provisions of the Agreement alleged to have been violated.

(a) Should the Local Union(s) or the Project Contractor or any Contractor have a dispute with the other party and if, after conferring, a settlement is not reached within three (3) working days, the dispute may be reduced to writing and proceed to Step 2 in the same manner as outlined herein for the adjustment of an employee complaint.

Step 2. The International Union Representative and the involved Contractor shall meet within seven (7) working days of the referral of a dispute to this second step to arrive at a satisfactory settlement thereof. Meeting minutes shall be kept by the Contractor. If the parties fail to reach an agreement, the dispute may be appealed by the Union, in writing, in accordance with the provisions of Step 3.

Step 3. (a) If the grievance has been submitted but not adjusted under Step 2, either party may request in writing, within seven (7) calendar days thereafter, that the grievance

be submitted to an Arbitrator mutually agreed upon by them. The Contractor and the involved Union shall attempt mutually to select an arbitrator, but if they are unable to do so, they shall request the Federal Mediation and Conciliation Services (FMCS) to provide them with a list of arbitrators from which the Arbitrator shall be selected. The rules of FMCS shall govern the conduct of the arbitration hearing. The decision of the Arbitrator shall be final and binding on all parties. The fee and expenses of such Arbitration shall be borne equally be the Contractor and the involved Local Union(s).

Section 4. Failure of the grieving party to adhere to the time limits established herein shall render the grievance null and void. Failure of the Contractor to adhere to the time limits established herein shall result in the grievance being sustained. The time limits established herein may be extended only by written consent of the parties involved at the particular step where the extension is agreed upon. The Arbitrator shall have the authority to make decisions only on issues presented to him or her, and he or she shall not have authority to change, amend, add to or detract from any of the provisions of this Agreement.

Section 5. The Owner shall be notified of all actions at Steps 2 and 3 and shall, upon their request, be permitted to participate in all proceedings at these steps.

ARTICLE VIII

JURISDICTIONAL DISPUTES

Section 1. The assignment of work will be the responsibility of the Contractor performing the work involved and such work assignments will be in accordance with decisions issued under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan"), or any successor Plan, adopted by the National Building and Construction Trades Department.

Section 2. All jurisdictional disputes on this Project, between or among Building and Construction Trades Unions and employers, parties to this Agreement, shall be settled and adjusted according to the present Plan established by the Building and Construction Trades Department or any other plan or method of procedure that may be adopted in the future by the Building and Construction Trades Department. Decisions

rendered shall be final, binding and conclusive on the Contractors and Unions parties to this Agreement.

Section 3. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Contractor's assignment shall be adhered to until the dispute is resolved. Individuals violating this section shall be subject to immediate discharge.

Section 4. Each Contractor will conduct a pre-job conference with the appropriate Council prior to commencing work. The Owner will be advised in advance of all such conferences and may participate if they wish.

ARTICLE IX

MANAGEMENT'S RIGHTS

Section 1. Exclusive Owner - Workforce. Except as otherwise provided in this Agreement, the Owner (or its designee) and the Contractors retain the authority to manage their operations and workforces.

Section 2. Materials, Design, Machinery, Equipment. There shall be no limitation or restriction by a signatory Union upon a Contractor's choice of materials or design, nor, regardless of source or location, upon the full use and utilization of equipment, machinery packaging, pre-cast, pre-fabricated, pre-finish, or pre-assembled materials, tools or other labor saving devices. The on-site installation or application of all items shall be performed by the craft having jurisdiction of such work; provided, however, that installation of specialty items may be performed by employees employed under this Agreement who may be directed by other personnel in a supervisory role, in circumstances requiring special knowledge of the particular items.

Section 3. New Technology, Equipment. The use of new technology, equipment, machinery, tools and/or labor saving devices and methods of performing work may be initiated by any Contractor from time to time during the Project. The Union agrees that it will not in any way restrict the implementation of such new devices or work methods.

Section 4. Disputes. If there is any disagreement between any Contractor and the Union concerning the manner or implementation of such device or method of work, the implementation shall proceed as directed by the Contractor, and the Union shall have the right to grieve and/or arbitrate the dispute as set forth in Article VII of

this Agreement.

ARTICLE X

WORK STOPPAGES

Section 1. No Strikes or Work Disruptions. There shall be no strike, sympathy strike, jurisdictional strike, recognitional strike, slowdown, sabotage, work to rule, sickout, sit down, picketing of any type (including informational picketing), handbilling, boycott, interruption of work or any disruptive activity that interferes with or interrupts in any way work on the Project. The applicable local union shall not sanction, aid or abet, encourage or continue any work stoppage, strike, picketing or other disruptive activity which violates this Article and shall undertake all reasonable means to prevent or to terminate any such activity. No employee shall engage in activity which violates this Article. Any employee who participates in or encourages any activity which violates this Article shall be subject to disciplinary action, including discharge, and if justifiably discharged for the above reasons, shall not be eligible for rehire on the same project for a period of not less than ninety (90) days. Further, if the Local Union is unable to provide qualified replacements for those employees who are in violation of this Article by the beginning of the next shift, the Employer is free to hire from any source.

Section 2. Union Responsibilities. The Local Union shall not be liable for acts of employees for which it has no responsibility. The principal officers of the Local Union will immediately instruct, order and use their best efforts to cause the members of the Local Union they represent to cease any violations of this Article. If it complies with this obligation, the Local Union shall not be responsible for unauthorized acts of employees it represents.

ARTICLE XI

WAGES AND BENEFITS

Section 1. Wages. All employees covered by this Agreement shall be classified in accordance with work performed and paid 100% of the wages and 100% of the fringe benefits as established in the respective Union's Local Area Collective Bargaining Agreement and any subsequent modifications thereto. The Contractor, upon request, shall provide the Unions and Owner with substantiation that wages and benefits are being paid on the Project. The Unions shall provide the Owner, and any

Contractor or subcontractor that is party to this Agreement, with wage, fringe benefit and dues reporting forms.

Section 2. Payment of Benefits/Contributions. Each Contractor will also pay all required contributions in the amounts required by Section 1 of this Article to the established employee benefit funds that accrue to the direct benefit of the employees (such as pension and annuity, health and welfare, vacation, apprenticeship, training funds). With respect to contributions required in this Section to Employer-Union jointly trusted funds, the Contractor adopts and agrees to be bound by the written terms of the legally established trust agreement specifying the detailed basis on which payments are to be made into, and benefits paid out of, such Trust Funds. The Contractor authorizes the parties to such Trust Funds to appoint Trustees and successor Trustees to administer the Trust Funds and hereby ratifies and accepts the Trustees so appointed as if made by Contractor.

Section 3. Non-Affiliated Labor Organizations. The Contractor shall deduct from each employee's wages all uniform dues and working assessments the employee has voluntarily authorized in writing as set forth in the Employee's Local Collective Bargaining Agreement. If a labor organization is not affiliated with the Council, and supplies its members or referrals for work on the Project, such labor organization shall pay to the Council the dues and assessments it would owe the Council if affiliated, for all periods during which the labor organization has members or referrals working on the Project. Any disputes under this paragraph shall be resolved exclusively between the labor organization and the Council by using the grievance procedure appearing in Article VII, as provided herein. All grievances shall be reduced to writing within thirty (30) days of the date on which the aggrieved party discovered the dispute. The grievance shall be initiated at Article VII, Section 3, Step 3.

ARTICLE XII
LOCAL UNION NEGOTIATIONS DURING
THE PENDENCY OF THE AGREEMENT

Section 1. All parties to this Agreement understand and acknowledge that some crafts who will be working on the Project are covered by local collective bargaining agreements that will expire prior to the projected completion of the Project. All parties

understand and agree that irrespective of whether such local collective bargaining agreement negotiations are successful or unsuccessful, there shall be no strike, sympathy strike, jurisdictional strike, recognitional strike, slowdown, sabotage, work to rule, sickout, sit down, picketing of any type (including informational picketing), handbilling, boycott, interruption of work or any disruptive activity that interferes with or interrupts in any way work on the Project by any Union involved in such local negotiations, or by any of its members, nor shall there be any lockout by a Contractor on the Project affecting such union or its members during the course of such negotiations. Irrespective of the status of any such local collective bargaining agreement negotiations, the affected Union and all of its members will observe and fully comply with the provisions of this Agreement. Should any Local Union fail or refuse to provide and/or refer qualified employees for work on the Project during an economic strike, any affected Contractor shall be permitted to utilize the procedures appearing in Article VI, Section 5 of this Agreement.

Section 2. Wage/Benefit Increases. Should a craft covered by this Agreement negotiate an increase in wages or an increase in benefits with any Contractor to become effective during the term of the Project, those wage and/or benefit increases shall be paid by the affected Contractor, as of the effective date of those increases, to those employees in that craft performing work covered by this Agreement.

ARTICLE XIII

HOURS OF WORK, OVERTIME, SHIFTS AND HOLIDAY

Section 1. Work Day and Work Week. Except as provided in Section 4, the first shift shall consist of eight (8) or ten (10) hours per day between the hours of 6:00 a.m. and 5:30 p.m., plus one-half (1/2) hour unpaid for lunch, approximately mid-way through the shift. Forty (40) hours per week shall constitute a regular week's work, whether consisting of five (5) eight (8) eight hours days, or four (4) ten (10) hour days. The work week will start on Monday and conclude on Sunday. A uniform starting time will be established for all crafts on each project or segment of the work. Nothing herein shall be construed as guaranteeing any employee eight (8) or ten (10) hours per day or forty (40) hours per week. The Union(s) shall be informed of the work starting time set by the contractor at the pre job conference which may be changed thereafter upon three (3) days' notice to the Union(s) and the employees. A second shift, if used, shall

consist of eight hours between 3:00 p.m. and 1:00 a.m.; a third shift, if used, shall begin between 10:00 p.m. and 1:00 a.m. For purposes of Section 3, the third shift shall be considered as part of the prior day's work.

Section 2. Starting Times. Employees shall be at their place of work at the starting time and shall remain at their place of work (as designated by the Contractor) performing their assigned functions until quitting time, which is defined as the scheduled end of the shift. The parties reaffirm their policy of a fair day's work for a fair day's wage. There shall be no pay for time not worked unless the employee is otherwise engaged at the direction of the Contractor.

Section 3. Overtime. Overtime shall be defined as all hours worked in excess of forty (40) hours in a work week or, for 8 hour shifts, in excess of eight (8) hours per day; or for 10 (ten) hour shifts for work in excess of 10 hours per day; such work and work performed on Saturdays shall be paid at one and one-half times the straight time rate of pay. However, in scheduled four (4) day/ten hour shift work weeks, Friday may be scheduled as a "makeup" day at straight time to make up for a day lost (Monday through Thursday) due to inclement weather. In addition, if a "make-up" day is scheduled, all employees directed to work on such day will be guaranteed a minimum of four (4) hours work or pay. In any week in which employees on the Project are scheduled on four/ten hour shifts, an employee whose first day of work on the Project begins on Wednesday or later day of the schedule shall be paid, during the first week of his employment only, time-and-one-half for all hours worked in excess of eight in a day or each day he works during said week. Work on Sundays and holidays shall be at double time. There shall be no restriction on any contractor's scheduling of overtime or the non-discriminatory designation of employees who will work. The contractor shall have the right to schedule work so as to minimize overtime. There shall be no pyramiding of overtime pay under any circumstances.

Section 4. Shifts.

(a) Shift work may be performed at the option of the Contractor(s) upon three (3) days' prior notice to the Union and shall continue for a period of not less than five (5) working days. Saturdays and Sundays, if worked, may be used for establishing the five (5) day minimum work shift. If two shifts are worked, each shall consist of eight (8) hours of continuous work exclusive of a one--

half (½) hour non-paid lunch period. Any third shift shall consist of seven (7) hours of continuous work exclusive of one-half (½) hour non-paid lunch period for eight (8) hours pay. A premium of $.25 per hour shall be paid for work on the second shift and $.50 per hour for work on the third shift.

(b) The Contractor may establish a work week of four (4) consecutive ten (10) hour work days (exclusive of one-half (½) hour unpaid lunch, approximately midway through the shift) between Monday through Thursday.

Section 5. Minimum Pay. An employee who reports for work at the regular starting time and for whom no work is provided shall receive pay equivalent to two (2) hours at the applicable hourly rate, provided the employee at the employer's discretion remains available for work. Any employee who reports for work and for whom work is provided shall be paid for actual time worked but not less than two (2) hours. It will not be a violation of this agreement when the employer considers it necessary to shut down to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked. In the case of a situation described above where the employer requests employees to remain available for work, the employees will be compensation for such time. If a project is shut down because of weather, employees, who report for work, shall be paid actual time worked but not less than two (2) hours. Procedures for prior notification of work cancellation shall be determined at the pre-job conference. The provisions of this section are not applicable where the employee voluntarily quits or lays off.

Section 6. Holidays. Holidays shall be New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day, the Day after Thanksgiving Day, and Christmas Day. A holiday falling on Saturday shall be observed on the preceding Friday. A holiday falling on Sunday shall be observed on the following Monday.

Section 7. Meal Period. The Contractor will schedule a meal period of not more than one-half hour duration at the work location at approximately the mid-point of the scheduled work shift (4 hours in a five day work week, 5 hours in a four-day work week), consistent with Section 1; provided, however, that the Contractor may, for efficiency of the operation, establish a schedule which coordinates the meal periods of

two or more crafts. If an employee is required to work through his meal period, he shall be compensated for the time worked at the applicable overtime rate and the employee shall, when work permits, eat his lunch "on the fly".

Section 8. No Organized Work Breaks. There will be one (1) break during the first four (4) hours of a shift which shall be taken at the employee's work station. Individual nonalcoholic beverage containers will be permitted at the employee's work station.

Section 9. Helmets to Hardhats.

(a) The Employers and the Unions recognize a desire to facilitate the entry into the building and construction trades of veterans who are interested in careers in the building and construction industry. The Employers and Unions agree to utilize the services of the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the parties.

(b) The Unions and Employers agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans for bona fide, provable past experience.

ARTICLE XIV

APPRENTICES

Section 1. Need For. The parties recognize the need to maintain continuing support of programs designed to develop adequate numbers of competent workers in the construction industry. The Contractor(s) will, accordingly, employ apprentices in their respective crafts to perform work on the Project in accordance with Section 2 below.

Section 2. Ratios. The Union agrees to cooperate with the Contractor in furnishing qualified apprentices as requested and if available. Apprentices shall

perform the work of their craft in accordance with the ratios and terms in their local area collective bargaining agreements. To the extent requested by Owner, the Contractor(s) may use the maximum number of apprentices permitted by local collective bargaining agreements.

ARTICLE XV

DRUG AND ALCOHOL POLICY

Section 1. Drug and Alcohol Policy. All parties understand and agree that a drug and alcohol policy, approved by the Council, will be in force for all work performed under the Agreement. The drug and alcohol policy will prohibit the use, sale, transfer, purchase and/or possession of a controlled substance, alcohol and/or firearms while on the Project's premises and will require testing of employees. The drug and alcohol policy, attached hereto as Appendix 2, is incorporated into and made part of this Agreement and is implemented for all Contractors and employees working on the Project.

ARTICLE XVI

NON-DISCRIMINATION

Section 1. Policy. It is the continuing policy of the Owner, the Contractors and the Unions that the provisions of this Agreement shall be applied without discrimination because of age, race, sex, color, religion, creed, national origin, sexual orientation or any other basis prohibited by applicable law.

ARTICLE XVII

SOLE AND COMPLETE AGREEMENT

Section 1. The parties agree that this Agreement constitutes the sole and complete agreement between them governing the rates of pay and working conditions of the construction employees working on the Project. This Agreement settles all demands and issues on the matters subject to collective bargaining and shall not be modified or supplemented in any way except by written agreement executed by the Owner and all parties.

ARTICLE XVIII

SEPARABILITY AND SAVINGS CLAUSE

Section 1. Intent of Parties. If any article or section of this Agreement shall be held invalid by law or by a tribunal of competent jurisdiction, or if compliance with or enforcement of any article should be restrained pending a final determination as to its

validity, the remainder of this Agreement shall not be affected and shall remain in full force and effect. In the event that any article or section is held invalid, the parties hereto shall, upon the request of the Unions, enter into collective bargaining negotiations for the purpose of arriving at a mutually satisfactory replacement for such article during the period of invalidity or restraint. If the Owner and the Council cannot agree on a mutually satisfactory replacement, either party shall be permitted to submit its demand to formal interest arbitration under the Rules of Federal Mediation and Conciliation Service.

Section 2. Force of Agreement. The parties recognize the right of the Owner to withdraw, at its absolute discretion, the utilization of this Agreement as part of any bid specification should a court of competent jurisdiction issue any order which could result, temporarily or permanently, in a delay of the bidding, awarding, and/or construction work on the Project. Notwithstanding such an action by the Owner, or such court order, the parties agree that the Agreement shall remain in full force and effect on the Project, to the maximum extent legally possible. It is hereby agreed that this Agreement covers all of the signatory local unions listed below.

Section 3. Delegation. The Owner, in its sole and absolute discretion has the right to delegate its duties hereunder to a representative and/or designee who may be either an employee of Owner or a third party with whom Owner has contracted for contractor services.

OWNER
CITY OF CANTON

Director of Public Service

EAST CENTRAL OHIO BUILDING & CONSTRUCTION TRADES COUNCIL, AFL-CIO

Dave Kunn

President

APPROVED AS TO FORM PRS

CITY OF CANTON
DIRECTOR OF LAW

BOILERMAKERS LOCAL NO. 744

By:

Name:

Title:

Date:

BRICKLAYERS LOCAL 6

By:

Name: Justin M. Gartrell

Title: Field Representative

Date: 11-29-21

ELECTRICIANS LOCAL NO. 540

By:

Name:

Title:

Date:

OWNER
CITY OF CANTON

_____

_____

APPROVED AS TO FORM

_____
CITY OF CANTON
DIRECTOR OF LAW

EAST CENTRAL OHIO BUILDING & CONSTRUCTION TRADES COUNCIL, AFL-CIO

_____

_____

BOILERMAKERS LOCAL NO. 744

By: _____

Name: MARTIN D. MAHON

Title: BUSINESS MANAGER, SEC. TREAS.

Date: 12 · 1 · 2021

BRICKLAYERS LOCAL 6

By: _____

Name: _____

Title: _____

Date: _____

ELECTRICIANS LOCAL NO. 540

By: _____

Name: _____

Title: _____

Date: _____

OWNER
CITY OF CANTON

_____

_____

APPROVED AS TO FORM

_____
CITY OF CANTON
DIRECTOR OF LAW

EAST CENTRAL OHIO BUILDING & CONSTRUCTION TRADES COUNCIL, AFL-CIO

_____

_____

BOILERMAKERS LOCAL NO. 744

By:_____

Name:_____

Title:_____

Date: _____

BRICKLAYERS LOCAL 6

By:_____

Name:_____

Title:_____

Date: _____

ELECTRICIANS LOCAL NO. 540

By: A M B

Name: Aaron M. Brown

Title: Business Manager / F.S.

Date: 12/2/2021

ELEVATOR CONSTRUCTORS LOCAL NO. 45

By: _____

Name: Ron Johnston

Title: BM

Date: 12/1/2021

GENERAL TRUCK DRIVERS & HELPERS UNION LOCAL NO. 92

By: _____

Name: Warren Borvstoski

Title: B.A.

Date: 12-7-21

GLAZIERS LOCAL NO. 1162

By: _____

Name: Scott Harter

Title: B.A.

Date: 11/29/21

HEAT & FROST INSULATORS AND ALLIED WORKERS LOCAL NO. 84

By: _____

Name: DAMON WROBEL

Title: BUSINESS MANAGER

Date: 12/01/21

INDIANA/KENTUCKY/OHIO REGIONAL COUNCIL OF CARPENTERS

By: _____

Name: Kevin M. Ennis II

Title: Senior Representative

Date: 11/23/21

IRONWORKERS LOCAL NO. 550

By: _____

Name: William U. Sheets II

Title: Business Manager

Date: 12-1-21

LABORERS LOCAL NO. 1015

By: _____

Name: Jake Croston Jr

Title: Business Manager

Date: 12/6/21

MILLWRIGHT PILEDRIVER LOCAL NO. 1090

By: _____

Name: Kevin M. Ennis II

Title: Senior Representative

Date: 11/23/21

OPERATIVE PLASTERERS' AND CEMENT MASONS LOCAL NO. 109

By: _____

Name: Bill Taggart

Title: Business Manager

Date: 11/16/2021

PAINTERS LOCAL NO. 603

By: _____

Name: Scott Harter

Title: B.A.

Date: 11-29-21

PLUMBERS, PIPEFITTERS AND REFRIGERATION LOCAL NO. 94

By: Dave Kiven

Name: DAVE KIVEN

Title: BUSINESS MANAGER

Date: 11/30/21

ROOFERS, LOCAL UNION NO. 88

By: Barbara A. Dixon

Name: Barbara A. Dixon

Title: BUSINESS MANAGER

Date: Nov. 22, 2021

SHEET METAL WORKERS LOCAL NO. 33

By:

Name: TERRY DURIEUX

Title: BUSINESS AGENT

Date: DEC 1, 2021

SPRINKLER FITTERS LOCAL NO. 669

By:_____

Name:_____

Title:_____

Date: _____

APPENDIX 1

LETTER OF ASSENT TO THE PROJECT LABOR AGREEMENT

FOR THE THURMAN MUNSON MEMORIAL STADIUM PARTIAL ROOF REPLACEMENT PROJECT

Pursuant to Article I, Section 1 of the Project Labor Agreement (the "Agreement") for the Thurman Munson Memorial Stadium Partial Roof Replacement Project (the "Project"), the undersigned party hereby agrees that it will comply with and be bound by all of the terms and conditions of the Agreement and agrees to all approved amendments or revisions thereto.

This Letter of Assent shall ONLY apply to the above-referenced Project and shall remain in effect for the duration of the above-referenced Project, after which this understanding will automatically terminate without further notice.

For the Contractor (or Subcontractor of whatever tier):

Name of Contractor/Subcontractor: _____

Name and Signature of Authorized Person:

(Print Name) _____

(Title) _____

(Signature) _____

(Phone #) _____

(Date) _____

APPENDIX 2

EMPLOYEE DRUG AND ALCOHOL TESTING POLICY

SPECIFICATIONS

The Owner is committed to providing a safe workplace for the workers assigned the Project, promoting high standards of employment health, and fostering productivity that satisfies its quality expectations. Consistent with the intent and spirit of this commitment, the Owner and ECOB & CTC have established a substance abuse testing specification for the Project with the goal of maintaining a work environment that is free from the effects of the use of illegal drugs and alcohol. The Owner will implement the terms of this policy.

This specification is not intended as a substitute for the Contractors' complete written substance abuse policy. Normally, such policies include other important features, including, but not limited to, an employee education and awareness Program, a supervisor training program and an employee assistance program.

The policy for this Project requires that any construction employee entering the project site will comply with the substance abuse testing requirements as outlined in this section. The Owner reserves the right to amend this specification upon written notice to the Contractor and the Unions on the Project. The parties to this agreement shall recognize the Drug Free Work Site Program as implemented through participating Unions and/or Contractors as administered by the contractor, or for contractors who are not signatory to agreements with signatory unions belonging to ECOB & CTC, and their core employees, an equivalent program that meets the specifications, contractual requirements, and testing requirements as set forth in this Appendix 1.

CONTRACTUAL REQUIREMENTS

All Contractors must have and enforce a written Substance Abuse Program incorporating the testing requirements, term, and conditions set forth in this specification. This specification is applicable to all employees, current and prospective, in order to be eligible to perform work at the Project. The Contractors must comply with the specification. Supplies, vendors, and visitors are subject to confirmation of their abstinence from the possession or use of substances indicated in this specification. A copy of each contractor's substance abuse program must be

submitted to the Owner for approval prior to commencement of any work on the Project site.

The substance abuse program must apply to all employees working on the Project and subcontractors' of any of tier working on the Project site. This includes workers, new hires, replacement workers, and supervisory personnel. No employee or prospective employee of a Contractor shall be permitted to work on the Project site unless such employee has submitted to testing by this specification and unless the results of such testing are negative as hereinafter defined. The Contractor must provide the Owner with a Monthly Summary Report of the Substance Abuse Program compliance.

All Contractors must train their respective employees in methods that will allow them to recognize substance abusers. Supervisory Employees of the Owner or its subcontractor shall be trained to take action, and to confront a substance abuser in a manner consistent with generally accepted safety-training procedures.

The cost of implementing the Substance Abuse program shall be borne by each respective Contractor affected by this specification.

Suppliers, vendors, and visitors must become signatory to the terms of this specification and their abstinence from substance abuse, and their continued avoidance of violations of the specification at the project site. Furthermore, in the event of an incident and/or accident occurrences involving suppliers, vendors, and/or visitors, the same agrees to submit to the substance abuse testing when requested. Refusal to comply would be grounds to have the supplier, vendor, or visitor permanently barred from the Project site by regulators.

TESTING REQUIREMENTS

The Project requires:

- Post-offer/Pre-engagement drug and alcohol testing.
- Testing for reasonable suspicion of illegal drug use or alcohol use.
- Post accident and post incident drug and alcohol testing upon reasonable suspicion.
- Drug testing following discovery of illegal or unauthorized drugs or paraphernalia as creating reasonable suspicion.

All Prime Contractors must perform post-offer/pre-engagement, and post

accident/incident testing upon reasonable suspicion, as follows:

a. All drug testing must be conducted by a National Institute of Drug Abuse (NIDA) certified laboratory with test results interpreted by a licensed medical review officer (MRO).
b. The initial screen tests for alcohol shall be performed by using either a saliva test or breathalyzer test comparable to the type used by state or local law enforcement officials. Furthermore, alcohol confirmatory tests shall be performed by using either blood alcohol test or a Breathalyzer test comparable to the type used by state or local law enforcement officials.
c. Evidence of the negative test results of individual employees required by this specification shall be furnished to the Owner prior to the commencement of work by the individual employee and promptly after performance of any subsequent testing required by this specification. Acceptable negative test result format.
   - A certificate signed by the testing laboratory, setting forth the nature and results of performed; or
   - An identification card signed by the respective Prime Contractor and issued to the individual employee, setting forth as reported on a certificate issued by the testing laboratory. The name of the testing laboratory shall also appear on the identification card; provided the affected employee authorizes the issuance of such identification card.

COMPLIANCE PROCEDURE

The Owner reserves the right to audit any substance abuse program required by this specification to verify compliance results within twenty-four (24) hours of notification of the intent to audit. The Owner shall have free right of access to all relevant records of the Prime Contractor and their subcontractors and supplies for this purpose, provided such record disclosures are within the scope of the States guidelines pertaining to confidentiality of employee records.

The Contractor's pre-engagement employees who receive a positive test result shall immediately leave the Project Site. Transportation of employees receiving the positive test result is the direct responsibility of the employing Prime Contractor, including employees of its subcontractors. Furthermore, pre-engagement employees

receiving a positive test shall not be permitted to return to the Project Site earlier than 90 days from the date of the positive test. At this time the employee may begin the process outlined by this specification again.

DEFINITIONS/ CONFIDENTIALITY/RULES- DISCIPLINARY ACTIONS- GRIEVANCE PROCEDURES

1. DEFINITIONS:

   (a) Company Premises - the term "Company Premises" as used in this policy includes all property, facilities, land, building, structures, automobiles, trucks and other vehicles owned, leased or used by the Contractor on the Project. Construction job sites for which the Contractor has responsibility are included.

   (b) Prohibited Items & Substances - Prohibited substances include illegal drugs (including controlled substances, look alike drugs and designer drugs, alcoholic beverages, and drug paraphernalia in the possession of or being used by an employee on the job.

   (c) Employee - Individuals, who perform work for the Contractor, including, but not limited to management, supervision, engineering, craft workers and clerical personnel.

   (d) Accident - Any event resulting in injury to a person or property to which an employee, or contractor/contractor's employee, contributed as a direct or indirect cause.

   (e) Incident - An event which has all the attributes of an accident, except that no harm was caused to person or property.

   (f) Reasonable Cause - Reasonable cause shall be defined as tardiness, excessive absenteeism, and erratic behavior such as noticeable imbalance, incoherence, and disorientation.

2. CONFIDENTIALITY

   (a) All parties to this policy and program have only the interests of employees in mind; therefore, encourage any employee with a substance abuse problem to come forward and voluntarily accept our assistance in dealing with the illness. An employee assistance program will provide guidance and direction for you during your recovery period. If you volunteer for help, the Contractor

will make every reasonable effort to return you to work upon your recovery. The Contractor will also take action to assure that your illness is handled in a confidential manner.

(b) All actions taken under this policy and program will be confidential and disclosed only to those with a "need to know."

(c) When a test is required, the specimen will be identified with a code number, not by name, to insure confidentiality of the donor. Each specimen container will be properly label and made tamper proof. The donor must witness this procedure.

(d) Unless an initial positive result is confirmed as positive, it shall be deemed negative and reported by the laboratory as such.

(e) The handling and transportation of each specimen will be properly documented through the strict chain of custody procedures.

3. RULES - all employees must report to work in a physical condition that will enable them to perform their jobs in a safe and efficient manner. Employees shall not:

(a) Use, possess, dispense or receive prohibited substances on or at the Project job site; or

(b) Report to work at or on the Project with any measurable amount of prohibited substances in their system.

4. DISCIPLINE - When the Contractor has reasonable cause to believe an employee is under the influence of a prohibited substance, for reasons of safety, the employee may be suspended until test results are available. If no test results are received after three (3) working days, the employee, if available, shall return to work with back pay. If the test results prove negative, the employee shall be reinstated with back pay. In all other cases:

(a) Applicants testing positive for drug use will not be hired.

(b) Employees who have not voluntarily come forward, and who test positive for a drug use, will be terminated.

(c) Employees who refuse to cooperate with testing procedures will be terminated.

(d) Employees found in possession of drugs or drug paraphernalia will be terminated.

(e) Employees found under the influence of alcohol while on duty, or while operating a company vehicle, will be subject to termination.

5. PRESCRIPTION DRUGS - Employees using a prescribed medication which, in their physician's opinion, may impair the performance of their duties, either mental or motor functions, must immediately inform the supervisor of such prescription drug use if instructed by their physician to do so. For the safety of all employees, the Contractor will consult with you and your physician to determine if a reassignment of duties is necessary. The Contractor will attempt to accommodate your needs by making an appropriate reassignment. However, if a reassignment is not possible, you will be placed on temporary medical leave until released as fit for duty by the prescribing physician.

Prevailing Wage Requirements and Rates

Overview

This project will utilize Ohio Prevailing Wage Rates. All contractors and subcontractors are required to comply with all Prevailing Wage Requirements in the Ohio Revised Code. These requirements are outlined below and sample documents are contained in the following pages and will be utilized to comply with these requirements. **Please note that the City of Canton will withhold payroll and/or retainage for a pay application or for the project in total until all prevailing wage issues are resolved.**

Payroll Dates Form

Must be submitted to the Prevailing Wage Coordinator (PWC) on or before the date your company starts work under the contract. It is to be completed with the **actual payroll dates** and not a day of the week. This requirement applies to all contractors/subcontractors.

Letter of Authorization for Payroll Signature

The person signing the certified payrolls must be an Owner or Corporate Officer of the company, or an Authorization letter must be completed and sent to the Prevailing Wage Coordinator. The document sent **must be** the **original signed notarized document**. If the person signing the payroll changes during the course of the project then a new Letter of Authorization for payroll signature must be submitted.

Fringe Benefits Form

Please complete and return along with the payroll dates form and letter of authorization for payroll signature form.

Notification to Employee Form

If your company is a **non-union company** you **must provide a completed Notification form to each employee working on this site and provide the PWC a copy** (wage and fringe benefit amounts on Notification must match amounts listed on payrolls), the form must have the Prevailing Wage Coordinator information, if you are a **union company** you need to send the PWC **a copy of the contract/agreement your company has with the local Trade Union(s)**.

Certified Payroll

The **first certified payroll** must be sent to the Prevailing Wage Coordinator **within two weeks of 1st pay period on the job**, payrolls must be sent **weekly** to the Prevailing Wage Coordinator if your company is working **four months or less** on site, payrolls must be sent **at least monthly** if working **more than four months** on site. Certified payroll forms used by contractors **must include all the information that is on payroll form included** with this package, if the payroll form you use does not have sections for all the information, it must be included as an attachment to the certified payroll. (During the project you may send copies of the certified payroll but **by the end of the project you must provide the original signed documents to the Prevailing Wage Coordinator** before you will receive your final payment). Fringe benefit break down needs to be attached to **each** payroll. For any **work classifications** requiring a group number (1-5) such as laborer or operating engineer if the group number or identifying equipment employee is operating is not entered a revised payroll will be required.

Affidavit of Compliance
When each contractor/subcontractor has completed their work on the job site they're required to submit a Final Affidavit of Compliance before the primary contractor receives their final payment and any retainer. Must send Prevailing Wage Coordinator original signed document.

Apprentices
Any/all apprentices working on this project must be registered with the State of Ohio Apprenticeship Council, apprentices on site cannot exceed ratios in the wage decision rate schedule, contractors/subs must provide the Prevailing Wage Coordinator a copy of the Apprenticeship Agreement from the program for each apprentice on the project with the first payroll on which they appear. You must provide the apprentice level/year, i.e. 1, 2, 3, etc. and/or percent of Journeyman's pay rate, i.e. 50%, 55%, etc. on the certified payrolls.

Subcontractors
If any subcontractors will be used during this project then a list of subcontractors including their name, address, and phone number must be provided to the Prevailing Wage Coordinator. The Prime contractor is responsible for all forms to be furnished to subcontractors, **along with wage rates** or any other modification vital to the project.

Prevailing Wage Rates
Attached are the State of Ohio Prevailing Wage Rates as of the posting date of this bid. Actual rates due to workers will be those in affect at the time of work. Please note that the wages of the County where the work is be completed will be in effect. Due to the location of the water treatment plants, this could be either Stark or Tuscarawas counties. Both are attached. All applicable prevailing wage rates must be posted on the job site for the duration of the project.

WEEKLY PAYROLLS

Each week as work progresses the Contractor must submit to the Prevailing Wage Coordinator original, certified, signed weekly payrolls containing the following information:

A) Name of each employee.

B) Employees' social security numbers

C) Special classification of employees (same as shown on wage determination or provisional approval.)

D) Rate of pay not less than that shown on the wage determination.

E) Allowable fringe benefits paid to the employee.

F) Hours worked each day and total hours worked for each week for each employee.

G) Gross amount paid to each employee.

H) Itemized deductions for each employee.

I) Net amount paid to each employee.

J) The following certification:

"I certify that the payroll is correct and complete, that the wage rates contained therein are not less than the applicable rates contained in the Wage Determination decision of the Department of Industrial Relations, Prevailing Wage Rate Division, State of Ohio, and that the classifications set forth for each laborer or mechanic conform with the work he performs".

_____ _____

(SIGNATURE) (TITLE)

PREVAILING WAGE COORDINATOR

The City of Canton has designated Cheryl Southwell as Prevailing Wage Coordinator, in accordance with Section 4115.071 of the Ohio Revised Code.

Her office is located at City of Canton, 218 Cleveland Ave SW, Canton, Ohio 47702
Cheryl Southwell: 330-438-4183

CONTRACTORS SUBMISSIONS TO THE WAGE COORDINATOR:

1) Contractors are required to supply to the Wage Coordinator, **a schedule of the dates during the life of the contract with City of Canton on which they are required to pay wages to the employees**. See Section 4115.03 (A) (2)

2) Contractors shall also deliver to the Wage Coordinator **a certified copy of the payroll within two weeks after the initial pay date and supplemental reports for each month thereafter, which shall exhibit for each employee, their name, current address, social security number, job classification, number of hours worked for project, rate of pay, project gross pay, fringe payments, total hours all jobs, total gross all jobs, and deductions from their wages.** See Section 4115.03 (A) (3)

3) If the life of the contract is expected to be no more than four months from the beginning of performance by the contractor or subcontractor, such supplemental reports shall be filed each week after the initial report. See Section 4115.03 (A) (6) (C)

4) The certification of each payroll shall be executed by the contractor, subcontractor, or duly appointed agent thereof and **include a State of Compliance** stating that the payroll is correct and complete and that during the payroll period, all persons employed on said project have been paid the full weekly wages earned, that no rebates have or will be made either directly or indirectly to, or on behalf of said contractor or subcontractor for the full weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions. See Section 4115.03 (A) (6) (C)

5) Contractors will also provide **each month a copy of any Labor Union Fringe Benefit Fund reports that they submitted to the unions**. See Section 4115.03

PREVAILING WAGE COORDINATOR MONITORING PROCEDURES

The wage Coordinator's duties are those specified in Section 4115.071 and shall include:

1 Attend Pre-Construction Meetings to advise contractor of Prevailing Wage responsibilities

2 Wage Coordinator has the authority to spot check employees pay checks in the field on the scheduled pay days for full compliance, with regard to the prevailing wage rates, including benefits.

3 Wage Coordinator shall visit the project site to get names of employees performing work on the project site, to cross check with payroll reports submitted.

4 Wage Coordinator shall verify the subcontractors performing work on the project site with regard to whether they have been approved by the contracting authority.

5 Wage Coordinator shall check to see that the prevailing wages are posted on the project site in a place accessible to employees.

6 Ascertain that the statement of compliance accompanying the certified payroll is the correct one for the project

7 Wage Coordinator has the right to request any addition information they feel is required for proper wage verification.

8 Contact Contractors of delinquent payrolls

9 Notify contractors when necessary to request payroll corrections

10 Investigate wage complaints ,by self or with Ohio Department of Commerce Division of Labor & Worker Safety

PAYROLL DATES
PREVAILING WAGE LAW

Instructions to the Contractor: Please read the following and provide the required information noted on this form. This document must be submitted to the Prevailing Wage Coordinator for the public authority on or before your company begins any work under a contract for a public improvement. This requirement is also applicable to your subcontractors. Please make a copy of this document available to them. The prevailing wage laws state that contractors are responsible for their subcontractors.

_____ will begin performance under contract on the
(Name of Contractor)

_____ project on _____
(Name and Location of Project) (Start Date)

and will conclude work on said project on _____.
(End Date, if known)

In accordance with Section 4115.071 (C) of the Ohio Revised Code, listing of payroll dates, I hereby submit the following schedule of dates that my company is required to pay wages to its workers while on this project.
NOTE: If the life of the project is expected to be over three (3) months in length, provide only the days of the week your pay period starts and ends, plus the day you pay your workers.

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Day Pay Period Starts:_____ Day Pay Period Ends:_____

Pay Day:_____

I acknowledge that I am required by section 4115.071 (C) of the Ohio Revised Code that I must submit a copy of my company's certified payroll records for this project to the Prevailing Wage Coordinator of the public authority within two weeks of the initial pay date listed above. I further acknowledge that I am responsible to collect and submit my subcontractor's prevailing wage documents, including their certified payroll records in accordance with the law.

_____ _____
(Contractor's Signature and Title) (Company Name)

_____
(Date)

LETTER OF AUTHORIZATION FOR PAYROLL SIGNATURE:

DATE: _____

COMPANY NAME: _____

ADDRESS: _____

_____

FEDERAL I.D.# _____

RE: _____

(Project Name) (Project Number)

_____

(Address)

_____ hereby authorizes

(Company Officer/Owner-Title)

_____ as the person to

complete and sign all certified payroll forms for the above project.

BY:_____

(Print Name)

_____

(Signature)

_____

(Title)

Sworn and subscribed in my presence this _____ day of _____ 20___

_____

Notary Public

FRINGE BENEFITS

PLEASE COMPLETE THIS FORM AND RETURN IT TO THE ADDRESS BELOW.

_____ FRINGE BENEFITS ARE ALL PAID IN CASH TO THE EMPLOYEE.

_____ FRINGE BENEFITS ARE PAID IN CASH AND TO THE BENEFIT PROGRAMS LISTED BELOW.

_____ FRINGE BENEFITS ARE ALL PAID TO THE FOLLOWING BENEFIT PROGRAMS:

HEALTH & WELFARE PLAN: _____

ADDRESS: _____

_____

PENSION PLAN: _____

ADDRESS: _____

_____

APPRENTICESHIP PROGRAM: _____

YOUR COMPANY IS: _____ UNION _____ NON-UNION

YOUR COMPANY PAYS ALL EMPLOYEES: _____ WEEKLY _____ BI-WEEKLY

FORWARD A BLANK FORM TO EACH SUBCONTRACTOR ON THE PROJECT FOR COMPLETION.
RETURN ALL FORMS TO:

CITY OF CANTON
218 CLEVELAND AVE SW
CANTON, OHIO 44702
ATTN: PREVAILING WAGE COORDINATOR

CONTRACTOR'S NAME: _____

ADDRESS: _____

PROJECT NAME: _____

PREVAILING WAGE NOTIFICATION to EMPLOYEE

4115.05 .....the contractor or subcontractor shall furnish each employee not covered by a collective bargaining agreement written notification of the job classification to which the employee is assigned, the prevailing wage determined to be applicable to that classification, separated into the hourly rate of pay and the fringe payments, and the identity of the prevailing wage coordinator appointed by the public authority. The contractor or subcontractor shall furnish the same notification to each affected employee every time the job classification of the employee is changed.

Project Name:	Job Number.
Contractor:	
Project Location:	
Jobsite posting of prevailing wage rates located:	

Prevailing Wage Coordinator	Employee
Name: City of Canton Attn: Cheryl Southwell	Name:
Street: 218 Cleveland Ave SW 6th Floor	Street:
City: Canton	City:
State/Zip: Ohio 44702	State/Zip:
Phone: 330-438-4183	Phone:

You will be performing work on this project that falls under these classifications. You will be paid the appropriate rate for the type of work you are performing.

Classification:	Prevailing Wage Rate Total Package:	Minus your fringe benefits:	Your hourly base rate:

Hourly fringe benefits paid on your behalf by this company:

Fringe	Amount	Fringe	Amount
Health Insurance		Vacation	
Life Insurance		Holiday	
Pension		Sick Pay	
Bonus		Training	
Other		**Total Hourly Fringes**	

ontractor's Signature:	Date:
Employee's Signature:	Date:

whpw1512 Notification to Employee

INSTRUCTIONS FOR PREPARING CERTIFIED PAYROLL REPORTS

General:

Contractors and subcontractors are required by law to submit certified payroll reports for work on projects covered by Ohio's Prevailing Wage Law. This form meets the reporting requirements established by Ohio Revised Code Chapter 4115. The use of this form is not mandatory; employers may submit their own forms provided that all of the required information is included. This form may be reproduced, or additional copies obtained from:

Ohio Department of Commerce
Division of Industrial Compliance
Bureau of Wage and Hour Administration
6606 Tussing Road, P.O. Box 4009
Reynoldsburg, Ohio 43068-9009
614-644-2239
www.com.ohio.gov

Certified Payroll Heading:

Employer name and address: Company's full name and address…Indicate if the company is a subcontractor.
Subcontractor: Check and list the name of the General Contractor or Prime.
Project: Name and location of the project, including county.
Contracting Public Authority: Name and address of the contracting public authority… (Owner of the project).
Week Ending: Month, day, and year for last day of reporting period.
Payroll # : Indicates first, second, third, etc. payroll filed by the company for the project.
Page indicator: number of pages included in the report.
Project Number: Determined by the public authority…If there is no number leave blank.

Payroll Information by column:

1. Employee Name, Address and Social Security number: This information must be provided for all employees that perform physical labor on the project. The Social Security number is required; the last four digits may be permitted by the public authority. Corporate officers, partners, and salaried employees are considered employees and must be paid the prevailing rate. Individual sole proprietors do not have to pay themselves prevailing rate but must report their hours on the project.

2. Work Class: List classification of work actually performed by employee. If unsure of work classification, consult the Ohio Department of Commerce-Division of Industrial Compliance & Labor-Bureau of Wage and Hour Administration. Employees working more than one classification should have separate line entries for each classification. Indicate what year/level for Apprentices. Be specific when using laborer and operator classifications; for example, Backhoe Operator or Asphalt Laborer or by "Group".

3. Hours Worked, Day & Date: In the first row of column 3, enter days of the company's pay period for example; M T W TH F S S. The second row is for the date that corresponds with each day for the pay period. In the employee information section, enter the number of hours worked on the prevailing wage project and which day the hours were worked. Separate rows are labeled for (ST) straight time hours and (OT) overtime hours. All hours worked after 40, must be paid at the appropriate overtime rate.

4. Project Total Hours : Total the hours entered for pay period.

5. Base Rate: Enter actual rate per hour paid to the employee. The overtime hourly rate is time and one-half the base rate listed in the prevailing wage schedule plus fringe benefits at straight time rate. The prevailing wage schedule lists the base rate plus fringe benefit amounts. These amounts added together equal the total prevailing wage rate. Employers must pay this total amount in one of three ways.
   1) Total rate may be paid in entirety in the base rate to the employee; in which case, the cash designation will be checked for fringe benefits.
   2) Total rate may be paid as listed in prevailing wage rate schedule with total fringe amounts paid approved plans.
   3) Total rate may be paid with a combination of base rate and fringe payments to approved plans in amounts other than those listed in schedule.

6. Project Gross: Enter total gross wages earned on the project for straight time and overtime. Project hours "X" base rate should equal project gross.

7. Fringes: If fringe benefits are paid in the hourly base rate, indicate this by marking the **Cash** space. If fringe benefits are paid to approved plans as listed in the prevailing wage rate schedule, mark the space **Approved Plans.** If fringe benefits are paid partially in the base rate and partially to approved plans, mark the space **Cash & Approved Plans.** List the hourly amount paid to approved plans for each fringe. If payments are not made on a per hour basis, ***calculate the hourly fringe credit by dividing the yearly employer contribution by*** the lesser of: hours actually worked in the year (these must be documented) or ***2080.*** Fringe benefits include: **Employer's share** of health insurance, life insurance, retirement plan, bonus/profit sharing, sick pay, holiday pay, personal leave, vacation, and education/training programs. If unsure of a possible fringe benefit, contact the Ohio Department of Commerce-Division of Industrial Compliance & Labor-Bureau of Wage and Hour Administration.

8. Total Hours All Jobs: Total all hours worked during the pay period including non-prevailing wage jobs.

9. Total Gross All Jobs: Gross amount earned in the pay period for all hours worked.

10. Self explanatory.

11. Self explanatory.

(a) The number of hours worked in each day and the total number of hours worked each week.

4. Hourly rate for each employee.
   (a) The minimum rate paid must be the wage rate for the appropriate classification. The Department's Wage Rate Schedule sets this rate.
   (b) All overtime worked is to be paid at time and one-half for all hours worked more than forty (40) per week.
5. Where fringes are paid into a bona fide plan instead of cash, list each benefit and amount per hour paid to program for each employee.
   (a) When the amount contributed to the fringe benefit plan and the total number of hours worked by the employee on all projects for the year are documented, the hourly amount is calculated by dividing the total contribution of the employer by the total number of hours worked by the employee.
   (b) When the amount contributed to the fringe benefit is documented but not the total hours worked, the hourly amount is calculated by **dividing the total yearly contribution by 2080.**
6. Gross amount earned on all projects during the pay period.
7. Total deductions from employee's wages.
8. Net amount paid.

J. The reports shall be certified by the contractor, subcontractor, or duly appointed agent stating that the payroll is correct and complete; and that the wage rates shown are not less than those required by the O.R.C. 4115.

K. Provide a Final Affidavit to the Prevailing Wage Coordinator upon the completion of the project.

CERTIFIED PAYROLL REPORT

Employer Name & Address	Name of General / Prime Contractor	Project Name & Location	Contracting Public Authority
Check if subcontractor ☐	Week Ending	Payroll # Page______Of_______	Project Number

1. Employee Name, Address and Social Security Number	2. Work Class	3. Hours Worked - Day & Date								4. Project Total Hrs	5. Base Rate	6. Project Gross	7. Fringes: Cash ☐ Approved Plans ☐ Cash & Approved Plans ☐					8. Total Hours All Jobs	9. Total Gross All Jobs	10. Taxes Withheld	11. Other Deducts	12. NET Paid
													H&W	Pens	Vac	App	Other					
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Date________________My signature on this form signifies that I pay, or supervise the payment of the employees shown above. I am certifying: 1) That during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done. 2) That the fringe benefits have been paid as indicated above. 3) That no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissable deductions as defined in the Ohio Revised Code Chapter 4115. 4) That apprentices are registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training. The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution.

Name and Title ____________________________ Signature ____________________________

AFFIDAVIT OF CONTRACTOR OR SUBCONTRACTOR

PREVAILING WAGES

I, _____,
(Name of person signing the affidavit) (Title)

of the _____, do hereby certify that the
(Company Name)

wages paid to all employees for the full number of hours worked in connection with the Contract to the Improvement, Repair and Construction of:

_____
(Project name and location of the project)

during the following period from _____ to _____

in accordance with the prevailing wage prescribed by the contract document.

I further certify that no rebates of deductions for any wages due any person have been directly or indirectly made other that those provided by law.

_____
(Signature of officer or agent)

Sworn to and subscribed in my presence this _____ day of _____

20_____.

_____
(Notary Public)

The above affidavit must be executed and sworn to by the officer or agent of the Contractor or Subcontractor who supervises the payment of employees, before the owner will release the surety and/or make a final payment due under the terms of the Contract.

Prevailing Wage Determination Cover Letter

County: STARK
Determination Date: 03/02/2022
Expiration Date: 06/02/2022

THE FOLLOWING PAGES ARE PREVAILING RATES OF WAGES ON PUBLIC IMPROVEMENTS FAIRLY ESTIMATED TO BE MORE THAN THE AMOUNT IN O.R.C. SEC. 4115.03 (b) (1) or (2), AS APPLICABLE.

Section 4115.05 provides, in part: "Where contracts are not awarded or construction undertaken within ninety days from the date of the establishment of the prevailing wages, there shall be a redetermination of the prevailing rate of wages before the contract is awarded." The expiration date of this wage schedule is listed above for your convenience only. This wage determination is not intended as a blanket determination to be used for all projects during this period without prior approval of this Department.

Section 4115.04, Ohio Revised Code provides, in part: "Such schedule of wages shall be attached to and made a part of the specifications for the work, and shall be printed on the bidding blanks where the work is done by contract..."

The contract between the letting authority and the successful bidder shall contain a statement requiring that mechanics and laborers be paid a prevailing rate of wage as required in Section 4115.06, Ohio Revised Code.

The contractor or subcontractor is required to file with the contracting public authority upon completion of the project and prior to final payment therefore an affidavit stating that he has fully complied with Chapter 4115 of the Ohio Revised Code.

The wage rates contained in this schedule are the "Prevailing Wages" as defined by Section 4115.03, Ohio Revised Code (the basic hourly rates plus certain fringe benefits). These rates and fringes shall be a minimum to be paid under a contract regulated by Chapter 4115 of the Ohio Revised Code by contractors and subcontractors. The prevailing wage rates contained in this schedule include the effective dates and wage rates currently on file. In cases where future effective dates are not included in this schedule, modifications to the wage schedule will be furnished to the Prevailing Wage Coordinator appointed by the public authority as soon as prevailing wage rates increases are received by this office.

"There shall be posted in a prominent and accessible place on the site of work a legible statement of the Schedule of Wage Rates specified in the contract to the various classifications of laborers, workmen, and mechanics employed, said statement to remain posted during the life of such contract." Section 4115.07, Ohio Revised Code.

Apprentices will be permitted to work only under a bona fide apprenticeship program if such program exists and if such program is registered with the Ohio Apprenticeship Council.

Section 4115.071 provides that no later than ten days before the first payment of wages is due to any employee of any contractor or subcontractor working on a contract regulated by Chapter 4115, Ohio Revised Code, the contracting public authority shall appoint one of his own employees to act as the prevailing wage coordinator for said contract. The duties of the prevailing wage coordinator are outlined in Section 4115.071 of the Ohio Revised Code.

Section 4115.05 provides for an escalator in the prevailing wage rate. Each time a new rate is established, that rate is required to be paid on all ongoing public improvement projects.

A further requirement of Section 4115.05 of the Ohio Revised Code is: "On the occasion of the first pay date under a contract, the contractor shall furnish each employee not covered by a collective bargaining agreement or understanding between employers and bona fide organizations of Labor with individual written notification of the job classification to which the employee is assigned, the prevailing wage determined to be applicable to that classification, separated into the hourly rate of pay and the fringe payments, and the identity of the prevailing wage Coordinator appointed by the public authority. The contractor or subcontractor shall furnish the same notification to each affected employee every time the job classification of the employee is changed."

Work performed in connection with the installation of modular furniture may be subject to prevailing wage.

THIS PACKET IS NOT TO BE SEPARATED BUT IS TO REMAIN COMPLETE AS IT IS SUBMITTED TO YOU. (Reference guidelines and forms are included in this packet to be helpful in the compliance of the Prevailing

Wage law.)
wh1500

Prevailing Wage Rate
Skilled Crafts

Name of Union: Asbestos Local 207 OH

Change # : LCN01-2018fbLoc207OH

Craft : Asbestos Worker Effective Date : 08/23/2018 Last Posted : 08/23/2018

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Asbestos Abatement	$25.50	$7.25	$6.45	$0.65	$0.00	$0.00	$0.07	$0.00	$0.00	$39.92	$52.67
Trainee	$16.50	$7.25	$1.50	$0.65	$0.00	$0.00	$0.07	$0.00	$0.00	$25.97	$34.22

Special Calculation Note :

Ratio :

3 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ASHLAND, ASHTABULA*, ATHENS, AUGLAIZE, BROWN, BUTLER*, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARDIN, HARRISON, HIGHLAND, HOCKING, HOLMES, HURON, KNOX, LAKE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MIAMI, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PORTAGE, PREBLE, RICHLAND, ROSS, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN*, WAYNE

Special Jurisdictional Note : Butler County:(townships of Fairfield,Hanover,Liberty,Milford,Morgan,Oxford,Ripley,Ross,StClair,Union & Wayne.) (Lemon & Madison) Warren County: (townships of: Deerfield, Hamilton, Harlan, Salem, Union & Washington). (Clear Creek, Franklin, Mossie, Turtle Creek & Wayney). Ashtabula County: (post offices & townships

of Ashtabula, Austinburg, Geneva, Harperfield, Jefferson, Plymouth & Saybrook) (townships of Andover, Cherry Valley, Colbrook, Canneaut, Denmark, Dorset, East Orwell, Hartsgrove, Kingville, Lenox, Monroe,Morgan,New Lyme,North Kingsville, Orwell, Pierpoint, Richmond Rock Creek, Rome, Shefield, Trumbull, Wayne, Williamsfield & Windsor) Erie County:(post offices & townships of Berlin, Berlin Heights,Birmingham,Florence ,Huron, Milan, Shinrock & Vermilion)

Details :

Asbestos & lead paint abatement including,but not limited to the removal or encapsulation of asbestos & lead paint,all work in conjunction with the preparation of the removal of same & all work in conjunction with the clean up after said removal.The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) is recognized as being the exclusive work of the Asbestos Abatement Workers.

On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers.

An Abatement Journeyman is anyone who has more than 300 hours in the Asbestos Abatement field.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Asbestos Local 84 Heat & Frost Insulators

Change # : LCN01-2018fbLoc84

Craft : Asbestos Worker Effective Date : 06/06/2018 Last Posted : 06/06/2018

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Asbestos Insulation Worker	$31.47		$9.49	$8.36	$0.36	$0.00	$3.39	$0.24	$0.00	$0.00	$53.31	$69.04
Apprentice	Percent											
1st Year	50.00	$15.74	$9.49	$8.36	$0.36	$0.00	$3.39	$0.24	$0.00	$0.00	$37.58	$45.44
2nd Year	60.00	$18.88	$9.49	$8.36	$0.36	$0.00	$3.39	$0.24	$0.00	$0.00	$40.72	$50.16
3rd Year	70.00	$22.03	$9.49	$8.36	$0.36	$0.00	$3.39	$0.24	$0.00	$0.00	$43.87	$54.88
4th Year	80.00	$25.18	$9.49	$8.36	$0.36	$0.00	$3.39	$0.24	$0.00	$0.00	$47.02	$59.60

Special Calculation Note : Other is Industry and Labor Management Fund

Ratio :

3 Journeymen to 1 Apprentice per shop

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, ASHTABULA*, CARROLL, COLUMBIANA, COSHOCTON, ERIE*, HARRISON, HOLMES, MAHONING, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, WAYNE

Special Jurisdictional Note : Ashtabula County: except for the townships of Ashtabula, Austinburg, Geneva, Harpersfield, Jefferson, Plymouth and Saybrook.Erie except Sandusky city limits.

Details :

The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) is recognized as being the exclusive work of the Asbestos Workers.
On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Boilermaker Local 744

Change # : LCNO1-2019fbLoc744

Craft : Boilermaker Effective Date : 04/03/2019 Last Posted : 04/03/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Boilermaker	$38.05		$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$67.76	$86.78
Apprentice	Percent											
1st 6 months	70.02	$26.64	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$56.35	$69.67
2nd 6 months	72.52	$27.59	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$57.30	$71.10
3rd 6 months	75.00	$28.54	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$58.25	$72.52
4th 6 months	77.51	$29.49	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$59.20	$73.95
5th 6 months	80.00	$30.44	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$60.15	$75.37
6th 6 months	85.03	$32.35	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$62.06	$78.24
7th 6 months	90.00	$34.25	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$63.96	$81.08
8th 6 months	95.00	$36.15	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$65.86	$83.93
Helper	60.00	$22.83	$7.07	$16.07	$0.74	$0.00	$5.08	$0.75	$0.00	$0.00	$52.54	$63.96

Special Calculation Note : Other is Supplemental Health

Ratio :

5 Journeymen to 1 Apprentice to 1 Helper

Jurisdiction (* denotes special jurisdictional note) :

ASHTABULA, CARROLL, COSHOCTON, CUYAHOGA, GEAUGA, HARRISON, HOLMES, LAKE, LORAIN, MAHONING, MEDINA, PORTAGE, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 6

Change # : LCN01-2021fbLoc6

Craft : Bricklayer Effective Date : 05/01/2021 Last Posted : 04/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer	$29.64		$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$48.78	$63.60
Pointer Caulker Cleaner	$29.64		$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$48.78	$63.60
Stone Mason	$29.64		$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$48.78	$63.60
Cement Mason	$29.64		$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$48.78	$63.60
Plaster	$29.64		$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$48.78	$63.60
Apprentice	Percent											
1st 6 months	55.00	$16.30	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$35.44	$43.59
2nd 6 months	60.00	$17.78	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$36.92	$45.82
3rd 6 months	65.00	$19.27	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$38.41	$48.04
4th 6 months	70.00	$20.75	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$39.89	$50.26
5th 6 months	75.00	$22.23	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$41.37	$52.49
6th 6 months	80.00	$23.71	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$42.85	$54.71
7th 6 months	90.00	$26.68	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$45.82	$59.15
8th 6 months	95.00	$28.16	$10.17	$7.73	$1.19	$0.00	$0.00	$0.05	$0.00	$0.00	$47.30	$61.38

Special Calculation Note : OTHER IS DRUG TESTING

Ratio :

1 Journeymen to 1 Apprentice
5 Journeymen to 2 Apprentice
9 Journeymen to 3 Apprentice
13 Journeymen to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :
CARROLL, STARK, TUSCARAWAS

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 8 Tile Finisher

Change # : LCN01-2014fbLoc8

Craft : Bricklayer Effective Date : 06/11/2014 Last Posted : 06/11/2014

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer Tile Marble Terrazzo Finisher	$23.17		$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$36.96	$48.55
Resilient flooring Wood Laminate Carpet Carpet Tile Finisher	$13.34		$5.00	$7.23	$0.00	$0.00	$0.00	$0.26	$0.00	$0.00	$25.83	$32.50
New Employees	Percent											
1st 30 days	59.89	$13.88	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.88	$20.81
2nd 30 days thru 6 months	59.89	$13.88	$5.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$18.88	$25.81
2nd 6 months	69.90	$16.20	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$29.99	$38.08
3rd 6 months	74.93	$17.36	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$31.15	$39.83
4th 6 months	79.88	$18.51	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$32.30	$41.55
5th 6 months	84.88	$19.67	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$33.46	$43.29
6th 6 months	89.88	$20.83	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$34.62	$45.03

7th 6 months	94.88	$21.98	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$35.77	$46.77
8th 6 months	94.88	$21.98	$5.00	$7.85	$0.20	$0.00	$0.37	$0.37	$0.00	$0.00	$35.77	$46.77

Special Calculation Note : Other $.40 is for International Masonry Training. Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.
Note that the classification description is clarified after the local union number at the top of the page.

Ratio :

Journeymen 4 to 1 Apprentice

Journeymen 6 to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ASHTABULA, CARROLL, COLUMBIANA, COSHOCTON, HARRISON, HOLMES, JEFFERSON, MAHONING, PORTAGE, STARK, TRUMBULL, TUSCARAWAS, WAYNE

Special Jurisdictional Note : Townships in Columbiana County are as follows: Salem, Perry, Fairfield, Center Elkrun, Middletown and Unity

Details :

Mechanic's assistants shall do all the handling, of sand, cement, lime, tile, marble, terrazzo and other materials used by the mechanics upon being delivered to the building or at the job. Hand rubbing, rolling, mixing, formulating, grinding, grouting, and cleaning of all marble, tile, mosaic, and terrazzo floors, and wainscoting, and such other work as is required in helping a mechanic as is the established custom of the trade. No limit to the tools, equipment or machinery used.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 8 Zone 2 Tile Setters & Finishers

Change # : LCN1-2021fbLoc6

Craft : Bricklayer Effective Date : 06/03/2021 Last Posted : 06/03/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer Tile Setter	$26.00		$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$41.46	$54.46
Marble Mason	$26.00		$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$41.46	$54.46
Terrazzo worker	$26.00		$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$41.46	$54.46
Finisher Support	$23.42		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$38.85	$50.56
Apprentice Finisher Support Only												
1st 30 days	$14.05		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$14.05	$21.08
30 days-6 months	$14.05		$8.49	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.54	$29.57
2ND 6 months	$16.39		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$31.82	$40.02
3RD 6 months	$17.57		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$33.00	$41.79
4TH 6 months	$18.74		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$34.17	$43.54
5TH 6 months	$19.91		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$35.34	$45.30
6TH 6 months	$21.08		$8.49	$6.35	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$36.51	$47.05
Apprentice	**Percent**											
1st 30 Days	60.00	$15.60	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15.60	$23.40
30 days- 6 months	60.00	$15.60	$8.49	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$24.09	$31.89
2nd 6 months	70.00	$18.20	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$33.66	$42.76
3rd 6 months	75.00	$19.50	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$34.96	$44.71
4th 6 months	80.00	$20.80	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$36.26	$46.66

5th 6 months	85.00	$22.10	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$37.56	$48.61
6th 6 months	90.00	$23.40	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$38.86	$50.56
7th 6 months	95.00	$24.70	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$40.16	$52.51
8th 6 months	95.00	$24.70	$8.49	$6.35	$0.62	$0.00	$0.00	$0.00	$0.00	$0.00	$40.16	$52.51

Special Calculation Note : Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.
Note that the classification description is clarified after the local union number at the top of the page.

Ratio :

4 Journeymen to 1 Apprentice
6 Journeymen to 1 Apprentice (Thereafter)

Jurisdiction (* denotes special jurisdictional note) :

BELMONT, CARROLL, HARRISON, JEFFERSON, MONROE, STARK, TUSCARAWAS

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Bricklayer Local 8 Zone 2 Tile Setters & Finishers

Change # : LCN1-2019fbLoc6

Craft : Bricklayer Effective Date : 06/01/2019 Last Posted : 05/29/2019

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer Tile Setter	$25.27		$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$39.26	$51.90
Marble Mason	$25.27		$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$39.26	$51.90
Terrazzo worker	$25.27		$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$39.26	$51.90
Finisher Support	$22.68		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$36.65	$47.99
APPRENTICE Finisher Support Only												
1st 30 days	$13.61		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$13.61	$20.41
30 days-6 months	$13.61		$7.55	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$21.16	$27.96
2ND 6 months	$15.88		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$29.85	$37.79
3RD 6 months	$17.01		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$30.98	$39.49
4TH 6 months	$18.14		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$32.11	$41.18
5TH 6 months	$19.28		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$33.25	$42.89
6TH 6 months	$20.41		$7.55	$5.85	$0.57	$0.00	$0.00	$0.00	$0.00	$0.00	$34.38	$44.59
Apprentice	**Percent**											
1st 30 Days	60.00	$15.16	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$15.16	$22.74
30 days- 6 months	60.00	$15.16	$7.55	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$22.71	$30.29
2nd 6 months	70.00	$17.69	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$31.68	$40.52
3rd 6 months	75.00	$18.95	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$32.94	$42.42
4th 6 months	80.00	$20.22	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$34.21	$44.31
5th 6 months	85.00	$21.48	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$35.47	$46.21
6th 6 months	90.00	$22.74	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$36.73	$48.10
7th 6 months	95.00	$24.01	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$38.00	$50.00
8th 6 months	95.00	$24.01	$7.55	$5.85	$0.59	$0.00	$0.00	$0.00	$0.00	$0.00	$38.00	$50.00

Special Calculation Note : Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.
Note that the classification description is clarified after the local union number at the top of the

page.

Ratio :

4 Journeymen to 1 Apprentice
6 Journeymen to 1 Apprentice (Thereafter)

Jurisdiction (* denotes special jurisdictional note) :

BELMONT, CARROLL, HARRISON, JEFFERSON, MONROE, STARK, TUSCARAWAS

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Commercial NE Zone 2B

Change # : LCN01-2021fbLocNEZone2B

Craft : Carpenter **Effective Date :** 05/21/2021 **Last Posted :** 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	$28.17		$7.81	$11.17	$0.56	$0.00	$1.12	$0.00	$0.00	$0.00	$48.83	$62.92
Apprentice	Percent											
1st 3 Months	60.00	$16.90	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16.90	$25.35
2nd 3 Months	60.00	$16.90	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$25.27	$33.72
2nd 6 Months is 1st year	60.00	$16.90	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$25.27	$33.72
3rd 6 Months	60.00	$16.90	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$25.27	$33.72
4th 6 Months is 2nd year	60.00	$16.90	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$25.27	$33.72
5th 6 Months	70.00	$19.72	$7.81	$7.82	$0.56	$0.00	$0.78	$0.00	$0.00	$0.00	$36.69	$46.55
6th 6 Months is 3rd year	75.00	$21.13	$7.81	$8.38	$0.56	$0.00	$0.84	$0.00	$0.00	$0.00	$38.72	$49.28
7th 6 Months	80.00	$22.54	$7.81	$8.94	$0.56	$0.00	$0.90	$0.00	$0.00	$0.00	$40.75	$52.01
8th 6 Months is 4th year	85.00	$23.94	$7.81	$9.49	$0.56	$0.00	$0.95	$0.00	$0.00	$0.00	$42.75	$54.73

Special Calculation Note :

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, STARK, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Local 509 NE District Interior Systems

Change # : LCN01-2010mmLoc509Int Systems

Craft : Carpenter Effective Date : 06/17/2010 Last Posted : 06/17/2010

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Carpenter Window Shade Venetian Blinds Drapery Installer	$15.50	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00			$15.50	$23.25

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE,

LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Millwright NE Zone M3

Change # : LCN01-2021fbLocNEZoneM3

Craft : Carpenter Effective Date : 05/21/2021 Last Posted : 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Millwright	$31.93		$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$53.36	$69.32
Certified Welder	$32.93		$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$54.36	$70.82
Lay-Out Man on Monorail	$33.43		$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$54.86	$71.57
Apprentice	**Percent**											
1st 6 months	60.00	$19.16	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$40.59	$50.17
2nd 6 months	60.00	$19.16	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$40.59	$50.17
3rd 6 months	62.00	$19.80	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$41.23	$51.12
4th 6 months	65.50	$20.91	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$42.34	$52.80
5th 6 months	69.00	$22.03	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$43.46	$54.48
6th 6 months	72.50	$23.15	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$44.58	$56.15
7th 6 months	76.00	$24.27	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$45.70	$57.83
8th 6 months	80.00	$25.54	$7.85	$10.90	$0.56	$0.00	$2.07	$0.05	$0.00	$0.00	$46.97	$59.75

Special Calculation Note : Other $0.05 is UBC Millwright Promotional Fund

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, STARK, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

The term "Millwright and Machine Erectors'" jurisdiction shall mean the unloading, hoisting, rigging, skidding, moving, dismantling, aligning, erecting, assembling, repairing, maintenance and adjusting of all

structures, processing areas either under cover, under ground or elsewhere, required to process material, handle, manufacture or service, be it powered or receiving power manually, by steam, gas, electricity, gasoline, diesel, nuclear, solar, water, air or chemically, and in industries such as and including, which are identified for the purpose of description, but not limited to, the following: woodworking plants; canning industries; steel mills; coffee roasting plants; paper and pulp; cellophane; stone crushing; gravel and sand washing and handling; refineries; grain storage and handling; asphalt plants; sewage disposal; water plants; laundries; bakeries; mixing plants; can, bottle and bag packing plants; textile mills; paint mills; breweries; milk processing plants; power plants; aluminum processing or manufacturing plants; and amusement and entertainment fields. The installation of mechanical equipment in atomic energy plants; installation of reactors in power plants; installation of control rods and equipment in reactors; and installation of mechanical equipment in rocket missile bases, launchers, launching gantry, floating bases, hydraulic escape doors and any and all component parts thereto, either assembled, semi-assembled or disassembled. The installation of, but not limited to, the following: setting-up of all engines, motors, generators, air compressors, fans, pumps, scales, hoppers, conveyors of all types, sizes and their supports; escalators; man lifts; moving sidewalks; hoists; dumb waiters; all types of feeding machinery; amusement devices; mechanical pin setters and spotters in bowling alleys; refrigeration equipment; and the installation of all types of equipment necessary and required to process material either in the manufacturing or servicing. The handling and installation of pulleys, gears, sheaves, fly wheels, air and vacuum drives, worm drives and gear drives directly or indirectly coupled to motors, belts, chains, screws, legs, boots, guards, booth tanks, all bin valves, turn heads and indicators, shafting, bearings, cable sprockets, cutting all key seats in new and old work, troughs, chippers, filters, calendars, rolls, winders, rewinders, slitters, cutters, wrapping machines, blowers, forging machines, rams, hydraulic or otherwise, planing, extruder, ball, dust collectors, equipment in meat packing plants, splicing of ropes and cables. The laying-out, fabrication and installation of protection equipment including machinery guards, making and setting of templates for machinery, fabrication of bolts, nuts, pans, drilling of holes for any equipment which the Millwrights install regardless of materials; all welding and burning regardless of type, fabrication of all lines, hose or tubing used in lubricating machinery installed by Millwrights; grinding, cleaning, servicing and any machine work necessary for any part of any equipment installed by the Millwrights; and the break-in and trial run of any equipment or machinery installed by the Millwrights. It is agreed the Millwrights shall use the layout tools and optic equipment necessary to perform their work.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter NE District Industrial Dock & Door

Change # : LCN01-2014fbCarpNEStatewide

Craft : Carpenter Effective Date : 03/05/2014 Last Posted : 03/05/2014 fringe 6.20

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	$19.70		$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$25.90	$35.75
Trainee	Percent											
1st Year	60.00	$11.82	$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$18.02	$23.93
2nd Year	80.20	$15.80	$5.05	$1.00	$0.15	$0.00	$0.00	$0.00	$0.00	$0.00	$22.00	$29.90

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING,

MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note : Industrial Dock and Door is the installation of overhead doors, roll up doors and dock leveling equipment

Details :
10/27/10 New Contract jc

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Insulation NE Zone 2B

Change # : LCN01-2021fbLocNEZone2B

Craft : Carpenter **Effective Date :** 05/21/2021 **Last Posted :** 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Insulation	$22.54		$7.81	$11.17	$0.56	$0.00	$1.12	$0.00	$0.00	$0.00	$43.20	$54.47
Apprentice	Percent											
1st 3 months	50.00	$11.27	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$11.27	$16.91
2nd 3 months	50.00	$11.27	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$19.64	$25.27
2nd 6 months	50.00	$11.27	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$19.64	$25.27
3rd 6 months	55.00	$12.40	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$20.77	$26.97
4th 6 months	60.00	$13.52	$7.81	$0.00	$0.56	$0.00	$0.00	$0.00	$0.00	$0.00	$21.89	$28.66
5th 6 months	70.00	$15.78	$7.81	$7.82	$0.56	$0.00	$0.78	$0.00	$0.00	$0.00	$32.75	$40.64
6th 6 months	75.00	$16.91	$7.81	$8.38	$0.56	$0.00	$0.84	$0.00	$0.00	$0.00	$34.50	$42.95
7th 6 months	80.00	$18.03	$7.81	$8.94	$0.56	$0.00	$0.90	$0.00	$0.00	$0.00	$36.24	$45.26
8th 6 months	85.00	$19.16	$7.81	$9.49	$0.56	$0.00	$0.95	$0.00	$0.00	$0.00	$37.97	$47.55

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, STARK, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Pile Driver NE Zone P3

Change # : LCN01-2021fbLocNEZoneP3

Craft : Carpenter Effective Date : 05/21/2021 Last Posted : 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Pile Driver	$28.18		$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$49.38	$63.47
Diver	$42.27		$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$63.47	$84.60
Certified Welder	$29.23		$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$50.43	$65.04
Apprentice	Percent											
1st 6 months	60.00	$16.91	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$38.11	$46.56
2nd 6 months	60.00	$16.91	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$38.11	$46.56
3rd 6 months	62.00	$17.47	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$38.67	$47.41
4th 6 months	65.50	$18.46	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$39.66	$48.89
5th 6 months	69.00	$19.44	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$40.64	$50.37
6th 6 months	72.50	$20.43	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$41.63	$51.85
7th 6 months	76.00	$21.42	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$42.62	$53.33
8th 6 months	80.00	$22.54	$7.82	$10.90	$0.56	$0.00	$1.92	$0.00	$0.00	$0.00	$43.74	$55.02

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

STARK, WAYNE, CARROLL, TUSCARAWAS

Special Jurisdictional Note :

Details :

Pile Drivers duties shall include but not limited to: Pile driving, milling, fashioning, joining assembling, erecting, fastening, or dismantling of all material of wood, plastic, metal, fiber, cork and composition and all other substitute materials: pile driving, cutting, fitting and placing of lagging, and the handling, cleaning,

erecting, installing and dismantling of machinery, equipment and erecting pre-engineered metal buildings. Pile Drivers work but not limited to: unloading, assembling, erection, repairs, operation, signaling, dismantling and reloading all equipment that is used for pile driving including pule butts is defined as sheeting or scrap piling. Underwater work that may be required in connection with the installation of piling. The driver and his tender work as a team and shall arrive at their own financial arrangements with the contractor. Any configuration of wood, steel, concrete or composite that is jetted, driven or vibrated onto the ground by conventional pile driving equipment for the purpose of supporting a future load that may be permanent or temporary. The construction of all wharves and docks, including the fabrication and installation of floating docks. Driving bracing, plumbing, cutting off and capping of all piling whether wood, metal, pipe piling or composite, loading, unloading, erecting, framing, dismantling, moving and handling of pile driving equipment piling used in the construction and repair of all wharves, docks, piers, trestles, caissons, cofferdams and erection of all sea walls and breakwaters. All underwater and marine work on bulkheads, wharves, docks, shipyards, caissons, piers, bridges, pipeline, work, viaducts, marine cable and trestles, as well as salvage and reclamation work where divers are employed. Rate shall include carpenters, acoustic and ceiling installers, drywall installers, pile drivers and floorlayers.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Carpenter Floorlayer NE Zone 2B

Change # : LCN01-2021fbLocNEZone2B

Craft : Carpenter **Effective Date :** 05/21/2021 **Last Posted :** 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Floorlayer	$28.17		$7.81	$11.17	$0.58	$0.00	$1.12	$0.00	$0.00	$0.00	$48.85	$62.94
Apprentice	Percent											
1st 3 Months	60.00	$16.90	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$16.90	$25.35
2nd 3 Months	60.00	$16.90	$7.81	$0.00	$0.58	$0.00	$0.00	$0.00	$0.00	$0.00	$25.29	$33.74
2nd 6 Months is 1st year	60.00	$16.90	$7.81	$0.00	$0.58	$0.00	$0.00	$0.00	$0.00	$0.00	$25.29	$33.74
3rd 6 Months	60.00	$16.90	$7.81	$0.00	$0.58	$0.00	$0.00	$0.00	$0.00	$0.00	$25.29	$33.74
4th 6 Months is 2nd year	60.00	$16.90	$7.81	$0.00	$0.58	$0.00	$0.00	$0.00	$0.00	$0.00	$25.29	$33.74
5th 6 Months	70.00	$19.72	$7.81	$7.82	$0.58	$0.00	$0.78	$0.00	$0.00	$0.00	$36.71	$46.57
6th 6 Months is 3rd year	75.00	$21.13	$7.81	$8.38	$0.58	$0.00	$0.84	$0.00	$0.00	$0.00	$38.74	$49.30
7th 6 Months	80.00	$22.54	$7.81	$8.94	$0.58	$0.00	$0.90	$0.00	$0.00	$0.00	$40.77	$52.03
8th 6 Months is 4th year	85.00	$23.94	$7.81	$9.49	$0.58	$0.00	$0.95	$0.00	$0.00	$0.00	$42.77	$54.75

Special Calculation Note :

Ratio :

2 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, STARK, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 HevHwy A

Change # : LCN01-2021fbHvyHwy

Craft : Bricklayer **Effective Date :** 06/01/2021 **Last Posted :** 05/26/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Sewer Water Works A	$30.40		$9.50	$7.57	$0.48	$0.00	$0.00	$0.00	$0.00	$0.00	$47.95	$63.15
Apprentice	Percent											
1st year	50.00	$15.20	$9.50	$7.57	$0.48	$0.00	$0.00	$0.00	$0.00	$0.00	$32.75	$40.35
2nd year	70.00	$21.28	$9.50	$7.57	$0.48	$0.00	$0.00	$0.00	$0.00	$0.00	$38.83	$49.47
3rd year	90.00	$27.36	$9.50	$7.57	$0.48	$0.00	$0.00	$0.00	$0.00	$0.00	$44.91	$58.59

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 3 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN

WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.
(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 HevHwy B

Change # : LCN01-2021fbHvyHwy

Craft : Bricklayer **Effective Date :** 06/01/2021 **Last Posted :** 05/26/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Power Plants Tunnels Amusement Parks B	$31.39		$9.50	$7.57	$0.49	$0.00	$0.00	$0.00	$0.00	$0.00	$48.95	$64.64
Apprentice	Percent											
1st year	50.00	$15.70	$9.50	$7.57	$0.49	$0.00	$0.00	$0.00	$0.00	$0.00	$33.26	$41.10
2nd year	70.00	$21.97	$9.50	$7.57	$0.49	$0.00	$0.00	$0.00	$0.00	$0.00	$39.53	$50.52
3rd year	90.00	$28.25	$9.50	$7.57	$0.49	$0.00	$0.00	$0.00	$0.00	$0.00	$45.81	$59.94

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 2 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT,

TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.
(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Statewide HevHwy Exhibit A District II

Change # : OCN01-2021fbCementHevHwy

Craft : Cement Mason **Effective Date :** 05/01/2021 **Last Posted :** 04/23/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$31.15		$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$49.72	$65.29
Apprentice	Percent											
1st Year	70.00	$21.80	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$40.37	$51.28
2nd Year	80.00	$24.92	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$43.49	$55.95
3rd Year	90.00	$28.03	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$46.60	$60.62

Special Calculation Note : Other $0.07 is for International Training Fund

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, AUGLAIZE, BROWN, BUTLER, CARROLL, CLERMONT, COLUMBIANA, DEFIANCE, ERIE, HAMILTON, HARDIN, HIGHLAND, HOLMES, HURON, LOGAN, LORAIN, MAHONING, MEDINA, MERCER, OTTAWA, PAULDING, PORTAGE, SANDUSKY, SENECA, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, VAN WERT, WARREN, WAYNE, WILLIAMS

Special Jurisdictional Note : (A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site, Heavy
Construction, Airport Construction Or Railroad Construction Work.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason Statewide HevHwy Exhibit B District II

Change # : OCN01-2021fbCementHevHwy

Craft : Cement Mason **Effective Date :** 05/01/2021 **Last Posted :** 04/23/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$32.02		$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$50.59	$66.60
Apprentice	Percent											
1st Year	70.00	$22.41	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$40.98	$52.19
2nd Year	80.00	$25.62	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$44.19	$56.99
3rd Year	90.00	$28.82	$8.25	$7.35	$0.65	$0.00	$2.25	$0.07	$0.00	$0.00	$47.39	$61.80

Special Calculation Note : Other $0.07 is for International Training Fund.

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, AUGLAIZE, BROWN, BUTLER, CARROLL, CLERMONT, COLUMBIANA, DEFIANCE, ERIE, HAMILTON, HARDIN, HIGHLAND, HOLMES, HURON, LOGAN, LORAIN, MAHONING, MEDINA, MERCER, OTTAWA, PAULDING, PORTAGE, SANDUSKY, SENECA, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, VAN WERT, WARREN, WAYNE, WILLIAMS

Special Jurisdictional Note : (B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant,
Waste Plant, & Water Treatment Facilities, Construction.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Cement Mason & Plasterer Local 109

Change # : LCN01-2020fbLoc109

Craft : Cement Effective Date : 07/09/2020 Last Posted : 07/09/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	$30.04		$8.89	$7.15	$0.40	$0.00	$4.25	$0.06	$0.00	$0.00	$50.79	$65.81
Plasterer	$29.33		$8.39	$7.15	$0.40	$0.00	$4.00	$0.06	$0.00	$0.00	$49.33	$64.00
Apprentice Cement Mason	**Percent**											
1st year	70.52	$21.18	$8.89	$7.15	$0.40	$0.00	$4.25	$0.06	$0.00	$0.00	$41.93	$52.53
2nd year	80.36	$24.14	$8.89	$7.15	$0.40	$0.00	$4.25	$0.06	$0.00	$0.00	$44.89	$56.96
3rd year	90.18	$27.09	$8.89	$7.15	$0.40	$0.00	$4.25	$0.06	$0.00	$0.00	$47.84	$61.39
Plasterer Apprentice												
1st year	68.89	$20.69	$8.39	$7.15	$0.40	$0.00	$4.00	$0.06	$0.00	$0.00	$40.69	$51.04
2nd year	78.45	$23.57	$8.39	$7.15	$0.40	$0.00	$4.00	$0.06	$0.00	$0.00	$43.57	$55.35
3rd year	88.05	$26.45	$8.39	$7.15	$0.40	$0.00	$4.00	$0.06	$0.00	$0.00	$46.45	$59.68

Special Calculation Note : Other is for International Training.

Ratio :

1 Journeymen to 1 Apprentice
5 Journeymen to 2 Apprentice

Jurisdiction (* denotes special jurisdictional note) :
CARROLL, HOLMES, MEDINA, PORTAGE, STARK, SUMMIT, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :
Finishers when applying colorshake shall be paid an additional $2.00 per DAY.
Swing Scaffolds up to 50 feet shall be paid $0.25 above the Journeymen rate.
Swing Scaffolds over 50 feet shall be paid $0.35 above the Journeymen rate.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 540 Inside

Change # : LCN01-2022sksLoc540in

Craft : Electrical **Effective Date :** 01/05/2022 **Last Posted :** 01/05/2022

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrician	$35.28		$6.50	$10.00	$1.09	$3.53	$3.88	$1.16	$0.00	$0.00	$61.44	$79.08
Apprentice	Percent											
1st 1000 hrs	45.00	$15.88	$6.50	$0.00	$0.44	$0.00	$0.48	$0.48	$0.00	$0.00	$23.78	$31.71
2nd 1000 hrs	47.00	$16.58	$6.50	$0.00	$0.46	$0.00	$0.50	$0.50	$0.00	$0.00	$24.54	$32.83
3rd 1500 hrs	50.00	$17.64	$6.50	$2.50	$0.53	$1.41	$0.57	$0.57	$0.00	$0.00	$29.72	$38.54
4th 1500 hrs	60.00	$21.17	$6.50	$5.00	$0.64	$1.69	$0.69	$0.69	$0.00	$0.00	$36.38	$46.96
5th 1500 hrs	70.00	$24.70	$6.50	$7.50	$0.75	$1.98	$0.80	$0.80	$0.00	$0.00	$43.03	$55.37
6th 1500 hrs	80.00	$28.22	$6.50	$10.00	$0.85	$2.26	$0.91	$0.91	$0.00	$0.00	$49.65	$63.77

Special Calculation Note : OTHER = (NEBF) National Electrical Benefit Fund. Vacation contribution is equal to 8% of the gross weekly wages.

Ratio :

The first person assigned to any job site shall be a Journeyman Wireman. Ratio thereafter:

1-3 Journeymen to 2 Apprentices
4 to 6 Journeymen up to 4 Apprentices
7 to 9 Journeymen up to 6 Apprentices

Jurisdiction (* denotes special jurisdictional note) :
CARROLL*, COLUMBIANA*, HOLMES, MAHONING*, STARK, TUSCARAWAS*, WAYNE*

Special Jurisdictional Note : Carroll County: North half including; Fox, Harrison, Rose and Washington Townships.
Columbiana County: Knox Township only.
Mahoning County: Smith Township only.
Tuscarawas County: That portion North of Auburn, Clay, Rush and York Townships.
Wayne County: That portion south of Baughman, Chester, Green and WayneTownships.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 540 Inside Lt Commercial Northern

Change # : LCN01-2022sksLoc540in

Craft : Electrical **Effective Date :** 01/05/2022 **Last Posted :** 01/05/2022

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrician	$35.28		$6.50	$10.00	$1.09	$3.53	$3.88	$1.16	$0.00	$0.00	$61.44	$79.08
CE-3 12,001-14,000 Hrs	$26.88		$6.47	$0.00	$0.87	$0.00	$0.81	$0.81	$0.00	$0.10	$35.94	$49.38
CE-2 10,001-12,000 Hrs	$21.12		$6.47	$0.00	$0.87	$0.00	$0.63	$0.63	$0.00	$0.10	$29.82	$40.38
CE-1 8,001-10,000 Hrs	$19.20		$6.47	$0.00	$0.87	$0.00	$0.58	$0.58	$0.00	$0.10	$27.80	$37.40
CW-4 6,001-8,000 Hrs	$17.28		$6.47	$0.00	$0.87	$0.00	$0.52	$0.52	$0.00	$0.10	$25.76	$34.40
CW-3 4,001-6,000 Hrs	$15.36		$6.47	$0.00	$0.87	$0.00	$0.46	$0.46	$0.00	$0.10	$23.72	$31.40
CW-2 2,001-4,000 Hrs	$14.40		$6.47	$0.00	$0.87	$0.00	$0.43	$0.43	$0.00	$0.10	$22.70	$29.90
CW-1 0-2,000 Hrs	$13.44		$6.47	$0.00	$0.87	$0.00	$0.40	$0.40	$0.00	$0.10	$21.68	$28.40
Apprentice	**Percent**											
1st 1000 hrs	45.00	$15.88	$6.50	$0.00	$0.44	$0.00	$0.48	$0.48	$0.00	$0.00	$23.78	$31.71
2nd 1000 hrs	47.00	$16.58	$6.50	$0.00	$0.46	$0.00	$0.50	$0.50	$0.00	$0.00	$24.54	$32.83
3rd 1500 hrs	50.00	$17.64	$6.50	$2.50	$0.53	$1.41	$0.57	$0.57	$0.00	$0.00	$29.72	$38.54
4th 1500 hrs	60.00	$21.17	$6.50	$5.00	$0.64	$1.69	$0.69	$0.69	$0.00	$0.00	$36.38	$46.96
5th 1500 hrs	70.00	$24.70	$6.50	$7.50	$0.75	$1.98	$0.80	$0.80	$0.00	$0.00	$43.03	$55.37
6th 1500 hrs	80.00	$28.22	$6.50	$10.00	$0.85	$2.26	$0.91	$0.91	$0.00	$0.00	$49.65	$63.77

Special Calculation Note : OTHER = (NEBF) National Electrical Benefit Fund

Ratio :

1 to 3 Journeymen to 2 Apprentices
4 to 6 Journeymen up to 4 Apprentices
7 to 9 Journeymen up to 6 Apprentices

Jurisdiction (* denotes special jurisdictional note) :
CARROLL*, COLUMBIANA*, HOLMES, MAHONING*, STARK, TUSCARAWAS*, WAYNE*

Construction Electrician and Construction Wireman
Ratio
There shall be a minimum ratio of one inside Journeyman Wireman to every (4) employees of different classifications per jobsite. An Inside Journeyman Wireman is required on the project as the fifth (5th) worker or when apprentices are used.

Special Jurisdictional Note : Carroll County: North half including; Fox, Harrison, Rose and Washington Townships.
Columbiana County: Knox Township only.
Mahoning County: Smith Township only.
Tuscarawas County: That portion North of Auburn, Clay, Rush and York Townships.
Wayne County: That portion south of Baughman, Chester, Green, Wayne and Wooster Townships.

The scope of work for the light commercial agreement shall apply to the following small medical clinics, stand-alone doctor and dentist offices with up to 600 amp service (not attached to a hospital), gas stations/convenience stores, fast food restaurants and franchised chain restaurants including independent bars and taverns, places of worship, funeral homes, nursing homes, assisted living facilities and day-care facilities under 15,000 sq ft, small office, retail/wholesale facilities under 15,000 sq ft with less than 10 units attached, storage units, car washes, express hotels and motels (4 stories or less) without conference or restaurants facilities, residential units (subject to Davis Bacon Rates) small stand-alone manufacturing facilities when free standing and not part of a larger facility (less than 15,000 sq ft) solar projects (500 panels or less) unless other wise covered under this agreement, lighting retrofits (when not associated with remodels involving branch re-circuiting) Lighting retrofits shall be defined as the changing of lamps and ballasts in existing light fixtures and shall also include the one for one replacement of existing fixtures.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 540 Voice Data Video

Change # : LCN01-2021sksLoc540VDV

Craft : Voice Data Video **Effective Date :** 08/31/2021 **Last Posted :** 08/25/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrical Installer Technician	$22.85		$6.40	$4.79	$0.57	$2.29	$2.07	$0.75	$0.00	$0.00	$39.72	$51.15
Cable Puller	$13.02		$6.40	$0.00	$0.29	$0.00	$0.39	$0.39	$0.00	$0.00	$20.49	$27.00
Apprentice Starting Prior to 08/01/2020												
2nd Step 65%	$14.85		$6.40	$0.00	$0.36	$1.19	$0.00	$0.48	$0.00	$0.00	$23.28	$30.70
3rd Step 75%	$17.14		$6.40	$4.79	$0.42	$1.37	$2.07	$0.56	$0.00	$0.00	$32.75	$41.32
4th Step 80%	$18.28		$6.40	$4.79	$0.44	$1.46	$2.07	$0.59	$0.00	$0.00	$34.03	$43.17
5th Step 85%	$19.42		$6.40	$4.79	$0.47	$1.55	$2.07	$0.63	$0.00	$0.00	$35.33	$45.04
6th Step 90%	$20.57		$6.40	$4.79	$0.50	$1.65	$2.07	$0.67	$0.00	$0.00	$36.65	$46.94
Apprentice Starting After 08/01/2020	**Percent**											
1st Step	60.00	$13.71	$6.40	$0.00	$0.31	$0.00	$1.24	$0.41	$0.00	$0.00	$22.07	$28.92
2nd Step	65.00	$14.85	$6.40	$3.11	$0.36	$1.19	$1.35	$0.48	$0.00	$0.00	$27.74	$35.17
3rd Step	75.00	$17.14	$6.40	$3.59	$0.42	$1.37	$1.55	$0.56	$0.00	$0.00	$31.03	$39.60
4th Step	85.00	$19.42	$6.40	$4.07	$0.47	$1.55	$1.76	$0.63	$0.00	$0.00	$34.30	$44.01

Special Calculation Note : OTHER = (NEBF) National Electrical Benefit Fund.

VACATION PAY - For Journeymen is 10% of wages and 8% for Apprentices.

Ratio :

1-3 Journeyman to 2 Apprentice
4-6 Journeyman to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL*, COLUMBIANA*, HOLMES, MAHONING*, STARK, TUSCARAWAS*, WAYNE*

** Exception - When fire alarm falls within the scope of this addendum, Cable Pullers can be used to aid in test and be the 2nd Teledata employee on the job

Special Jurisdictional Note : Carroll County includes the following townships: North half including Fox, Harrison, Rose and Washington. Tuscarawas County includes the following townships: The portion North of Auburn, Clay, Rush and York. Wayne County includes the following townships: The portion South of Baughman, Chester, Green, and Wayne. Columbiana County includes Knox township. Mahoning County includes Smith township.

Details :

CABLE PULLERS - are for the installation of cable from one termination point to another.

The following work is EXCLUDED from the Teledata Technician work scope:

* - Installation of computer systems in industrial applications such as assembly lines, robotics, computer controller manufacturing systems.
* - Installation of conduit and/ or raceways shall be installed by Inside Wireman . On sites where there is no Inside Wireman employed, the Teledata Technician may install raceway, or conduit not greater than 10 feet.
* - Fire Alarm work on all new construction sites or wherever the fire alarm system is installed in conduit.
* - All HVAC control work.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 71 High Tension Pipe Type Cable

Change # : LCN01-2021fbLoc7

Craft : Lineman Effective Date : 03/16/2021 Last Posted : 03/16/2021

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	$45.61	$6.75	$1.37	$0.46	$0.00	$10.95	$0.60	$0.00	$0.00	$65.74	$88.54
Certified Lineman Welder	$45.61	$6.75	$1.37	$0.46	$0.00	$10.95	$0.60	$0.00	$0.00	$65.74	$88.54
Certified Cable Splicer	$45.61	$6.75	$1.37	$0.46	$0.00	$10.95	$0.60	$0.00	$0.00	$65.74	$88.54
Operator A	$40.88	$6.75	$1.23	$0.41	$0.00	$9.81	$0.60	$0.00	$0.00	$59.68	$80.12
Operator B	$36.20	$6.75	$1.09	$0.36	$0.00	$8.69	$0.60	$0.00	$0.00	$53.69	$71.79
Operator C	$29.12	$6.75	$0.87	$0.29	$0.00	$6.99	$0.60	$0.00	$0.00	$44.62	$59.18
Groundman 0-12 months Exp	$22.81	$6.75	$0.68	$0.23	$0.00	$5.47	$0.60	$0.00	$0.00	$36.54	$47.94
Groundman 0-12 months Exp w/CDL	$25.09	$6.75	$0.75	$0.25	$0.00	$6.02	$0.60	$0.00	$0.00	$39.46	$52.01
Groundman 1 yr or more	$25.09	$6.75	$0.75	$0.25	$0.00	$6.02	$0.60	$0.00	$0.00	$39.46	$52.01
Groundman 1 yr or more w/CDL	$29.65	$6.75	$0.85	$0.28	$0.00	$6.50	$0.60	$0.00	$0.00	$44.63	$59.46
Equipment Mechanic A	$36.20	$6.75	$1.09	$0.36	$0.00	$8.69	$0.60	$0.00	$0.00	$53.69	$71.79
Equipment Mechanic B	$32.66	$6.75	$0.98	$0.33	$0.00	$7.84	$0.60	$0.00	$0.00	$49.16	$65.49
Equipment Mechanic C	$29.12	$6.75	$0.87	$0.29	$0.00	$6.99	$0.60	$0.00	$0.00	$44.62	$59.18
X-Ray Technician	$45.61	$6.75	$1.37	$0.46	$0.00	$10.95	$0.60	$0.00	$0.00	$65.74	$88.54

Apprentice	Percent											
1st 1000 hrs	60.00	$27.37	$6.75	$0.82	$0.27	$0.00	$6.57	$0.60	$0.00	$0.00	$42.38	$56.06
2nd 1000 hrs	65.00	$29.65	$6.75	$0.89	$0.30	$0.00	$7.12	$0.60	$0.00	$0.00	$45.31	$60.13
3rd 1000 hrs	70.00	$31.93	$6.75	$0.96	$0.32	$0.00	$7.66	$0.60	$0.00	$0.00	$48.22	$64.18
4th 1000 hrs	75.00	$34.21	$6.75	$1.03	$0.34	$0.00	$8.21	$0.60	$0.00	$0.00	$51.14	$68.24
5th 1000 hrs	80.00	$36.49	$6.75	$1.09	$0.36	$0.00	$8.76	$0.60	$0.00	$0.00	$54.05	$72.29
6th 1000 hrs	85.00	$38.77	$6.75	$1.16	$0.39	$0.00	$9.30	$0.60	$0.00	$0.00	$56.97	$76.35
7th 1000 hrs	90.00	$41.05	$6.75	$1.23	$0.41	$0.00	$9.85	$0.60	$0.00	$0.00	$59.89	$80.41

Special Calculation Note : Other is Health Retirement Account

Operator "A"
John Henry Rock Drill, D-6 (or equivalent) and above, Trackhoe Digger, (320 Track excavator), Cranes (greater then 25 tons and less than 45 tons).

Operator "B"
Cranes (greater than 6 tons and up to 25 tons), Backhoes, Road Tractor, Dozer up to D-5, Pressure Digger- wheeled or tracked, all Tension wire Stringing equipment.

Operator "C"
Trench, Backhoe, Riding type vibratory Compactor, Ground Rod Driver, Boom Truck (6 ton & below), Skid Steer Loaders, Material Handler.

*All Operators of cranes 45 ton or larger shall be paid the journeyman rate of pay. $0.30 is for Health Retirement Account.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON,

WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

Heli - Arc Welding will be paid $.30 above Journeyman rate. Additional compensation of 10% over the Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 71 Outside Utility Power

Change # : LCN01-2021fbLoc7

Craft : Lineman Effective Date : 03/16/2021 Last Posted : 03/16/2021

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	$43.22	$6.75	$1.30	$0.43	$0.00	$10.37	$0.60	$0.00	$0.00	$62.67	$84.28
Substation Technician	$43.22	$6.75	$1.30	$0.43	$0.00	$10.37	$0.60	$0.00	$0.00	$62.67	$84.28
Cable Splicer	$45.26	$6.75	$1.36	$0.45	$0.00	$10.86	$0.60	$0.00	$0.00	$65.28	$87.91
Operator A	$38.75	$6.75	$1.16	$0.39	$0.00	$9.30	$0.60	$0.00	$0.00	$56.95	$76.32
Operator B	$34.27	$6.75	$1.03	$0.34	$0.00	$8.22	$0.60	$0.00	$0.00	$51.21	$68.34
Operator C	$27.54	$6.75	$0.83	$0.28	$0.00	$6.61	$0.60	$0.00	$0.00	$42.61	$56.38
Groundman 0-12 months Exp	$21.61	$6.75	$0.65	$0.22	$0.00	$5.19	$0.60	$0.00	$0.00	$35.02	$45.82
Groundman 0-12 months Exp w/CDL	$23.77	$6.75	$0.71	$0.24	$0.00	$5.70	$0.60	$0.00	$0.00	$37.77	$49.66
Groundman 1 yr or more	$23.77	$6.75	$0.71	$0.24	$0.00	$5.70	$0.60	$0.00	$0.00	$37.77	$49.66
Groundman 1 yr or more w/CDL	$28.09	$6.75	$0.84	$0.28	$0.00	$6.74	$0.60	$0.00	$0.00	$43.30	$57.35
Equipment Mechanic A	$34.27	$6.75	$1.03	$0.34	$0.00	$8.22	$0.60	$0.00	$0.00	$51.21	$68.34
Equipment Mechanic B	$30.91	$6.75	$0.93	$0.31	$0.00	$7.42	$0.60	$0.00	$0.00	$46.92	$62.38
Equipment Mechanic C	$27.54	$6.75	$0.83	$0.28	$0.00	$6.61	$0.60	$0.00	$0.00	$42.61	$56.38
Line Truck w/uuger	$30.44	$6.75	$0.91	$0.30	$0.00	$7.31	$0.60	$0.00	$0.00	$46.31	$61.53
Apprentice	**Percent**										

1st 1000 hrs	60.00	$25.93	$6.75	$0.78	$0.26	$0.00	$6.22	$0.60	$0.00	$0.00	$40.54	$53.51
2nd 1000 hrs	65.00	$28.09	$6.75	$0.84	$0.28	$0.00	$6.74	$0.60	$0.00	$0.00	$43.30	$57.35
3rd 1000 hrs	70.00	$30.25	$6.75	$0.91	$0.30	$0.00	$7.26	$0.60	$0.00	$0.00	$46.07	$61.20
4th 1000 hrs	75.00	$32.42	$6.75	$0.97	$0.32	$0.00	$7.78	$0.60	$0.00	$0.00	$48.84	$65.04
5th 1000 hrs	80.00	$34.58	$6.75	$1.04	$0.35	$0.00	$8.30	$0.60	$0.00	$0.00	$51.62	$68.90
6th 1000 hrs	85.00	$36.74	$6.75	$1.10	$0.37	$0.00	$8.82	$0.60	$0.00	$0.00	$54.38	$72.75
7th 1000 hrs	90.00	$38.90	$6.75	$1.17	$0.39	$0.00	$9.34	$0.60	$0.00	$0.00	$57.15	$76.60

Special Calculation Note : Other is Health Retirement Account
Operator "A"
John Henry Rock Drill, D-6 (or equivalent) and above, Trackhoe Digger, (320 Track excavator), Cranes (greater then 25 tons and less than 45 tons).

Operator "B"
Cranes (greater than 6 tons and up to 25 tons), Backhoes, Road Tractor, Dozer up to D-5, Pressure Digger- wheeled or tracked, all Tension wire Stringing equipment.

Operator "C"
Trench, Backhoe, Riding type vibratory Compactor, Ground Rod Driver, Boom Truck (6 ton & below), Skid Steer Loaders, Material Handler.

Ratio :

(1) Journeyman Lineman to (1) Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note : 0.30 is for Health Retirement Account.

Details :
Heli - Arc Welding will be paid $.30 above Journeyman rate. Additional compensation of 10% over the

Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 71 Outside (North Central Ohio)

Change # : LCN01-2021fbLoc71CentralOhio

Craft : Lineman **Effective Date :** 03/16/2021 **Last Posted :** 03/16/2021

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	$40.31	$6.75	$1.21	$0.40	$0.00	$7.66	$0.06	$0.00	$0.00	$56.39	$76.54
Traffic Signal & Lighting Journeyman	$38.77	$6.75	$1.16	$0.39	$0.00	$7.37	$0.06	$0.00	$0.00	$54.50	$73.89
Equipment Operator	$35.41	$6.75	$1.06	$0.35	$0.00	$6.73	$0.06	$0.00	$0.00	$50.36	$68.06
Groundman 0-12 months (W/O CDL)	$21.47	$6.75	$0.64	$0.21	$0.00	$4.08	$0.06	$0.00	$0.00	$33.21	$43.95
Groundman 0-12 months (W/CDL) plus	$23.46	$6.75	$0.70	$0.23	$0.00	$4.46	$0.06	$0.00	$0.00	$35.66	$47.39
Groundsman greater than 1 Year (W/CDL)	$25.45	$6.75	$0.76	$0.25	$0.00	$4.84	$0.06	$0.00	$0.00	$38.11	$50.83
Traffic Signal Apprentices											
1st 1,000 hours	$23.26	$6.75	$0.70	$0.23	$0.00	$4.42	$0.06	$0.00	$0.00	$35.42	$47.05
2nd 1,000 hours	$25.20	$6.75	$0.76	$0.25	$0.00	$4.79	$0.06	$0.00	$0.00	$37.81	$50.41
3rd 1,000 hours	$27.14	$6.75	$0.81	$0.27	$0.00	$5.16	$0.06	$0.00	$0.00	$40.19	$53.76
4th 1,000 hours	$29.08	$6.75	$0.87	$0.29	$0.00	$5.53	$0.06	$0.00	$0.00	$42.58	$57.12
5th 1,000 hours	$31.01	$6.75	$0.93	$0.31	$0.00	$5.89	$0.06	$0.00	$0.00	$44.95	$60.46
6th 1,000 hours	$34.89	$6.75	$1.05	$0.35	$0.00	$6.63	$0.06	$0.00	$0.00	$49.73	$67.17
Apprentice Lineman	**Percent**										

1st 1,000 Hours	60.00	$24.19	$6.75	$0.73	$0.24	$0.00	$4.60	$0.06	$0.00	$0.00	$36.57	$48.66
2nd 1,000 Hours	65.00	$26.20	$6.75	$0.79	$0.26	$0.00	$4.98	$0.06	$0.00	$0.00	$39.04	$52.14
3rd 1,000 Hours	70.00	$28.22	$6.75	$0.85	$0.28	$0.00	$5.36	$0.06	$0.00	$0.00	$41.52	$55.63
4th 1,000 Hours	75.00	$30.23	$6.75	$0.91	$0.30	$0.00	$5.74	$0.06	$0.00	$0.00	$43.99	$59.11
5th 1,000 Hours	80.00	$32.25	$6.75	$0.97	$0.32	$0.00	$6.13	$0.06	$0.00	$0.00	$46.48	$62.60
6th 1,000 Hours	85.00	$34.26	$6.75	$1.03	$0.34	$0.00	$6.51	$0.06	$0.00	$0.00	$48.95	$66.09
7th 1,000 Hours	90.00	$36.28	$6.75	$1.09	$0.36	$0.00	$6.89	$0.06	$0.00	$0.00	$51.43	$69.57

Special Calculation Note : Other is Safety & Education Fund.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BELMONT, CARROLL, HARRISON, HOLMES, JEFFERSON, MEDINA, PORTAGE, STARK, SUMMIT, WAYNE

Special Jurisdictional Note :

Details :

A groundman when directed shall assist a Journeyman in the performance of his/her work on the ground, including the use of hand tools. A Groundman under no circumstances shall climb poles, towers,ladders, or work from an elevated platform or bucket truck.

No more than three (3) Groundmen shall work alone. Jobs with more that three Groundmen shall be supervised by a Groundcrew Foreman, Journeyman Lineman, Journeyman Traffic Signal Technician or an Equipment Operator.

Scope of Work: installation and maintenance of highway and street lighting, highway and street sign lighting, electronic message boards and traffic control systems, camera systems, traffic signal work, substation and line construction including overhead and underground projects for private and industrial work as in accordance with the IBEW Constitution. This Agreement includes the operation of all tools and equipment necessary for the installation of the above projects.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Electrical Local 71 Voice Data Video Outside

Change # : LCR01-2017fbLoc71VDV

Craft : Voice Data Video Effective Date : 10/18/2017 Last Posted : 10/18/2017

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Installer Technician I	$23.46	$5.50	$0.70	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$29.96	$41.69
Installer Technician II	$22.37	$5.50	$0.67	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$28.84	$40.03
Equipment Operator I	$22.37	$5.50	$0.67	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$28.84	$40.03
Equipment Operator II	$18.43	$5.50	$0.55	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$24.78	$33.99
Installer /Repair Outside	$22.37	$5.50	$0.67	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$28.84	$40.03
Ground Driver V/CDL	$15.83	$5.50	$0.47	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$22.10	$30.01
Groundman	$13.24	$5.50	$0.40	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$19.44	$26.06
Cable Splicer	$23.46	$5.50	$0.70	$0.00	$0.00	$0.30	$0.00	$0.00	$0.00	$29.96	$41.69

Special Calculation Note :

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :
Cable Splicer: Inspect and test lines or cables, analyze results, and evaluate transmission characteristics. Cover conductors with insulation or seal splices with moisture-proof covering. Install, splice, test, and repair cables using tools or mechanical equipment. This will include the splicing of

fiber.

Journeyman Technician I: Must know all aspects of telephone and cable work. This is to include aerial, underground, and manhole work. Must know how to climb and run bucket. Must have all the tools required to perform these tasks. Must be able to be responsible for the safety of the crew at all times. Must also have CDL license and have at least 5 years experience.

.staller/Repairman: Perform tasks of repairing, installing, and testing phone and CATV services.

Technician II: Have at least three years of telephone and CATV experience. Must have the knowledge of underground, aerial, and manhole work. Must be able to climb and operate bucket. Must have CDL. Must have all tools needed to perform these tasks.

Equipment Operator I: Able to operate a digger derrick or bucket truck. Have at least 5 years of experience and must have a valid CDL license.

Equipment Operator II: Able to operate a digger derrick or bucket truck. Have at least 3 years of experience and must have a valid CDL license.

Groundman W/CDL: Must have a valid CDL license and be able to perform tasks such as: climbing poles, pulling downguys, making up material, and getting appropriate tools for the job. Must have at least 5 year's experience.

Groundman: Perform tasks such as: climbing poles, pulling downguys, making up material, and getting appropriate tools for the job. Experience 0-5 years.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Elevator Local 45

Change # : LCN01-2012kpLoc45

Craft : Elevator Effective Date : 04/04/2012 Last Posted : 04/04/2012

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Elevator Mechanic	$41.92		$11.03	$6.96	$0.55	$3.35	$5.00	$0.00	$0.00	$0.00	$68.81	$89.77
Helper	$29.34		$11.03	$6.96	$0.55	$1.76	$5.00	$0.00	$0.00	$0.00	$54.64	$69.31
0-6 months Probation	50.00	$20.96	$11.03	$6.96	$0.55	$1.26	$5.00	$0.00	$0.00	$0.00	$45.76	$56.24
1st year	55.00	$23.06	$11.03	$6.96	$0.55	$1.38	$5.00	$0.00	$0.00	$0.00	$47.98	$59.50
2nd year	65.00	$27.25	$11.03	$6.96	$0.55	$1.64	$5.00	$0.00	$0.00	$0.00	$52.43	$66.05
3rd year	70.00	$29.34	$11.03	$6.96	$0.55	$1.76	$5.00	$0.00	$0.00	$0.00	$54.64	$69.32
4th year	80.00	$33.54	$11.03	$6.96	$0.55	$2.01	$5.00	$0.00	$0.00	$0.00	$59.09	$75.85

Special Calculation Note : Vacation moves to 8% of BHR after 5 years

Ratio :

The total number of Helpers & Apprentices employed shall not exceed the number of Mechanics on any one job, except on jobs where (2) teams or more are working, (1) extra Helper or Apprentice may be employed for the first (2) teams and an extra Helper or Apprentice for each additional (3) teams.

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COLUMBIANA, COSHOCTON, HARRISON, HOLMES, MAHONING, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Vacation 6%/under 5 years based on regular hourly rate for all hours worked. 8%/over 5 years based on regular hourly rate for all hours worked.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Glazier Local 1162

Change # : LCN01-2021fbLoc1162

Craft : Glazier Effective Date : 05/21/2021 Last Posted : 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Glazier	$27.77		$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$41.79	$55.68
Apprentice	Percent											
1st 6 months	50.00	$13.89	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$27.91	$34.85
2nd 6 months	55.00	$15.27	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$29.29	$36.93
3rd 6 months	60.00	$16.66	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$30.68	$39.01
4th 6 months	65.00	$18.05	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$32.07	$41.10
5th 6 months	70.00	$19.44	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$33.46	$43.18
6th 6 months	75.00	$20.83	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$34.85	$45.26
7th 6 months	80.00	$22.22	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$36.24	$47.34
8th 6 months	90.00	$24.99	$6.88	$6.79	$0.35	$0.00	$0.00	$0.00	$0.00	$0.00	$39.01	$51.51

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice
2 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COSHOCTON, HOLMES, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Add $1.25 per hour for High Pay which is all work that requires the employee be supported by equipment which hangs or suspends from the roof of a building or structure including all repelling .

Prevailing Wage Rate
Skilled Crafts

Name of Union: Ironworker Local 550

Change # : LCR02-2021fbLoc550

Craft : Ironworker **Effective Date :** 04/14/2021 **Last Posted :** 04/14/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker	$30.17		$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$51.66	$66.75
Apprentice	Percent											
1st 6 months	60.00	$18.10	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$39.59	$48.64
2nd 6 months	65.00	$19.61	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$41.10	$50.91
3rd 6 months	70.00	$21.12	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$42.61	$53.17
4th 6 months	75.00	$22.63	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$44.12	$55.43
5th 6 months	80.00	$24.14	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$45.63	$57.69
6th 6 months	85.00	$25.64	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$47.13	$59.96
7th 6 months	90.00	$27.15	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$48.64	$62.22
8th 6 months	95.00	$28.66	$8.58	$9.02	$0.75	$0.00	$2.73	$0.41	$0.00	$0.00	$50.15	$64.48

Special Calculation Note : OTHER IS: JOURNEYMAN UPGRADE AND WELLNESS FUND.

Ratio :

4 Journeymen to 1 Apprentice
1 Journeymen to 1 Apprentice, spinning of cable for suspension bridge
1 Journeymen to 1 Apprentice, ornamental work
2 Journeymen to 1 Apprentice, reinforcing work
1 Journeymen to 2 Apprentice, roadway

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COLUMBIANA*, COSHOCTON, HOLMES*, HURON, MAHONING*, MEDINA*, PORTAGE*, RICHLAND, STARK, SUMMIT*, TUSCARAWAS, WAYNE

Special Jurisdictional Note : The jurisdictional line between Local 17 and Local 550 is determined as follows: All territory North of Old Route 224 line to be within the jurisdiction of Local 17. All territory South of Old Route 224 line is to be the jurisdiction of Local 550, except for everything within the City limits of Barberton which shall be under the jurisdiction of Local 17.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Ironworker Local 550 Glass & Curtain Wall

Change # : LCN01-2017fbLoc550

Craft : Ironworker Effective Date : 07/01/2017 Last Posted : 06/28/2017

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker Glass & Curtain Wall	$22.00		$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$36.89	$47.89
pprentice	Percent											
1st 6 months	60.00	$13.20	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$28.09	$34.69
2nd 6 months	65.00	$14.30	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$29.19	$36.34
3rd 6 months	70.00	$15.40	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$30.29	$37.99
4th 6 months	75.00	$16.50	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$31.39	$39.64
5th 6 months	80.00	$17.60	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$32.49	$41.29
6th 6 months	85.00	$18.70	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$33.59	$42.94
7th 6 months	90.00	$19.80	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$34.69	$44.59
8th 6 months	95.00	$20.90	$7.00	$7.47	$0.09	$0.00	$0.33	$0.00	$0.00	$0.00	$35.79	$46.24

Special Calculation Note :

Ratio :

. Apprentice to 1 Journeymen

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COLUMBIANA*, COSHOCTON, HOLMES, HURON*, MAHONING*, MEDINA*, PORTAGE*, RICHLAND, STARK, SUMMIT*, TUSCARAWAS, WAYNE

Special Jurisdictional Note : The jurisdictional line between Locals 17 and 550 is determined as follows: All territory North of Old Route 224 line is to be within the jurisdiction of Local 17. All territory South of Old Route 224 line is to be the jurisdiction of Local 550, except for everything within the City limits of Barberton which shall be under the jurisdiction of Local 17.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Labor HevHwy 2

Change # : LCN01-2021fbLaborHevHwy2

Craft : Laborer Group 1 Effective Date : 05/01/2021 Last Posted : 04/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	$33.70		$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$45.65	$62.50
Group 2	$33.87		$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$45.82	$62.75
Group 3	$34.20		$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$46.15	$63.25
Group 4	$34.65		$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$46.60	$63.92
Watch Person	$26.00		$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$37.95	$50.95
Apprentice	**Percent**											
0-1000 hrs	60.00	$20.22	$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$32.17	$42.28
1001-2000 hrs	70.02	$23.60	$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$35.55	$47.35
2001-3000 hrs	80.00	$26.96	$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$38.91	$52.39
3001-4000 hrs	90.00	$30.33	$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$42.28	$57.45
More Than 4000 hrs	100.00	$33.70	$7.50	$3.90	$0.45	$0.00	$0.00	$0.00	$0.10	$0.00	$45.65	$62.50

Special Calculation Note : Watchman has no Apprentices. Tunnel Laborer rate with air-pressurized add $1.00 to the above wage rate.

Ratio :

1 Journeymen to 1 Apprentice
3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ASHTABULA, ERIE, HURON, LORAIN, LUCAS, MAHONING, MEDINA, OTTAWA, PORTAGE, SANDUSKY, STARK, SUMMIT, TRUMBULL, WOOD

Special Jurisdictional Note : Hod Carriers and Common Laborers - Heavy, Highway, Sewer, Waterworks, Utility, Airport, Railroad, Industrial and Building Site, Sewer Plant, Waste Water Treatment Facilities Construction

Details :

Group 1

Laborer (Construction); Plant Laborer or Yardman, Right-of-way Laborer, Landscape Laborer, Highway Lighting Worker, Signalization Worker, (Swimming) Pool Construction Laborer, Utility Man, *Bridge Man, Handyman, Joint Setter, Flagperson, Carpenter Helper, Waterproofing Laborer, Slurry Seal, Seal Coating, Surface Treatment or Road Mix Laborer, Riprap Laborer & Grouter, Asphalt Laborer, Dump Man (batch trucks), Guardrail & Fence Installer, Mesh Handler & Placer, Concrete Curing Applicator, Scaffold Erector, Sign Installer, Hazardous Waste (level D), Diver Helper, Zone Person and Traffic Control.

*Bridge Man will perfomr work as per the October 31, 1949, memorandum on concrete forms, byand between the United Brotherhood of Caprpenters and Joiners of Americ and the Laborers' International Union of North America, which states in; "the moving, cleaning, oiling and carrying to the next point of erection, and the stripping of forms which are not to be re-used, and forms on all flat arch work shall be done by memebers of the Laborers' International Union of North America."

Group 2
Asphalt Raker, Screwman or Paver, Concrete Puddler, Kettle Man (pipeline), All Machine-Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Skid Steer, Sheeting & Shoring Person, Surface Grinder Person, Screedperson, Water Blast, Hand Held Wand, Power Buggy or Power Wheelbarrow, Paint Striper, Plastic fusing Machine Operator, Rodding Machine Operator, Pug Mill Operator, Operator of All Vacuum Devices Wet or Dry, Handling of all Pumps 4 inches and under (gas, air or electric), Diver, Form Setter, Bottom Person, Welder Helper (pipeline), Concrete Saw Person, Cutting with Burning Torch, Pipe Layer, Hand Spiker (railroad), Underground Person (working in sewer and waterline, cleaning, repairing and reconditioning). Tunnel Laborer (without air),Caisson, Cofferdam (below 25 feet deep), Air Track and Wagon Drill, Sandblaster Nozzle Person, Hazardous Waste (level B), ***Lead Abatement, Hazardous Waste (level C)

***Includes the erecting of structures for the removal, including the encapsulation and containment of Lead abatement process.

Group 3
Blast and Powder Person, Muckers will be defined as shovel men working directly with the miners, Wrencher (mechanical joints & utility pipeline), Yarner, Top Lander, Hazardous Waste (level A), Concrete Specialist, Curb Setter and Cutter, Grade Checker, Concrete Crew in Tunnels. Utility pipeline Tappers, Waterline, Caulker, Signal Person will receive the rate equal to the rate paid the Laborer classification for which the Laborer is signaling.

Group 4
Miner,Welder, Gunite Nozzle Person

A.) The Watchperson shall be responsible to patrol and maintain a safe traffic zone including but not limited to barrels, cones, signs, arrow boards, message boards etc.
The responsibility of a watchperson is to see that the equipment, job and office trailer etc. are secure.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Labor Local 1015 Building

Change # : LCN01-2021fbLoc1015

Craft : Laborer **Effective Date :** 07/14/2021 **Last Posted :** 07/14/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	$29.57		$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$41.47	$56.26
Group 2	$29.97		$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$41.87	$56.85
Group 3	$30.32		$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$42.22	$57.38
Group 4	$30.27		$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$42.17	$57.31
Group 5	$22.61		$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$34.51	$45.82
Apprentice	Percent											
0-1000 hrs	60.00	$17.74	$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$29.64	$38.51
1001-2000 hrs	70.00	$20.70	$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$32.60	$42.95
2001-3000 hrs	80.00	$23.66	$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$35.56	$47.38
3001-4000 hrs	90.00	$26.61	$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$38.51	$51.82
More than 4000 hrs	100.00	$29.57	$7.50	$3.90	$0.40	$0.00	$0.00	$0.00	$0.10	$0.00	$41.47	$56.26

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice
4 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :
CARROLL, STARK, WAYNE

Special Jurisdictional Note :

Details :
Group 1
Building & Construction Laborer, Signalman, Flagman, Tool Cribman, Carpenter Tender, Finisher Tender, Concrete Handler, Utility Construction Laborer, Guard Rail Erectors, Hazardous Waste (Level D)

Group 2
Bottom Man, Scaffold Builder, Tunnel laborer, Pipe Layer, Air and Power Driven Tools, Burner on Demolition Work, Swinging Scaffold, Mucker, Caisson Worker, Cofferdam Worker, Powder Men and

Dynamite Blaster, Creosote Worker, Form Setter, Plasterer Tender, Hod Carrier Laser Beam Set-up Man, All confined space work, furnaces, pickel tubs, acid-pits, and Hazardous Waste Level (C)

Group 3
Mason Tender, Mortar Mixer, Stonemason Tender,skid-loader, Hazardous Waste Level (B)

Group 4
Gunnite Operator, Hazardous Waste Level (A)

Group 5
Watchman

Prevailing Wage Rate
Skilled Crafts

Name of Union: Operating Engineers - Building Local 18 - Zone III

Change # : LCN01-2021sksLoc18zone3

Craft : Operating Engineer Effective Date : 08/13/2021 Last Posted : 08/13/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Group A	$39.14		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$55.09	$74.66
Group B	$39.02		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$54.97	$74.48
Group C	$37.98		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$53.93	$72.92
Group D	$36.80		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.75	$71.15
Group E	$31.34		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.29	$62.96
Master Mechanic	$39.39		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$55.34	$75.03
Cranes 150'-180'	$39.64		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$55.59	$75.41
Cranes 180'-249'	$40.14		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$56.09	$76.16
Cranes 249' and over	$40.39		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$56.34	$76.53
Apprentice	Percent											
1st Year	50.00	$19.57	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$35.52	$45.31
2nd Year	60.00	$23.48	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$39.43	$51.18
3rd Year	70.00	$27.40	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$43.35	$57.05
4th Year	80.00	$31.31	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.26	$62.92
Field Mechanic Trainee			$8.76	$6.25	$0.85			$0.09				
1st Year	50.00	$19.57	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$35.52	$45.31
2nd Year	60.00	$23.48	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$39.43	$51.18
3rd Year	70.00	$27.40	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$43.35	$57.05
4th Year	80.00	$31.31	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.26	$62.92

Special Calculation Note : Other: Education & Safety $0.09

Ratio :

For every (3) Operating Engineer Journeymen employed by the company there may be employed (1) Registered Apprentice or trainee Engineer through the referral when they are available. An apprenice, while employed as part of a crew per Article VIII, paragraph

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE,

78, will not be subject to the apprenticeship ratios in this collective bargaining agreement	FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WYANDOT

Special Jurisdictional Note :

Details :

Note: There will be a 10% increase for the apprentices on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Group A- Barrier Moving Machines; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types); Compact Cranes, track or rubber over 4,000 pounds capacity; Cranes self-erecting, stationary, track or truck (all configurations); Derricks (all types); Draglines; Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Forklift (rough terrain with winch/hoist); Gradalls; Helicopter Operators, hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types); Hoists (with two or more drums in use); Horizonal Directional Drill; Hydraulic Gantry (lift system); Laser Finishing Machines; Laser Screed and like equipment; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Operator/Technician(Mechanic Operator/Technician and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms; Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device); Rotary Drills (all), used on caissons for foundations and sub-structure; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Trench Machines (over 24" wide); Tug Boats.

Group B - Articulating/end dumps (minus $4.00/hour from Group B rate); Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs.; Bulldozers; CMI type Equipment; Concrete Saw, Vermeer-type; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats;, Rotomills (all), grinders and planers of all types.

Group C - A-Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or Skid Steer Loader with or without attachments; Boilers (15 lbs. pressure and over); All Concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drills - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call button controlled), Buck Hoists, Transport Platforms, Construction Elevators; Hydro Vac/Excavator (when a second person is needed, the rate of pay will be "Class E"); Man Lifts; Material hoist/elevators; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie (Inserter/Remover); Rotovator (Lime-Soil Stabilizer); Submersible Pumps (4"and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24" and under); Utility Operators.

Group D - Backfillers and Tampers; Ballast Re-locator; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Mixers, more than one bag capacity; Concrete Mixers, one bag capacity (side loaders); All Concrete Pumps (without boom with 4" or smaller system); Concrete Spreader; Conveyors, used for handling building materials; Crushers; Deckhands; Drum Fireman (in asphalt plants); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators: Gunite Machines; Hydro-seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2") discharge); Road Widening Trenchers; Rollers (except asphalt); Self-propelled sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepsfoot post roller or grader; VAC/ALLS; Vibratory Compactors, with integral power; Welders.

Group E – Allen Screed Paver (concrete); Boilers (less than 15 lbs. pressure); Cranes-Compact, track or rubber (under 4,000 pounds capacity); Directional Drill "Locator"; Fueling and greasing +$3.00; Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalperson, Submersible Pumps (under 4" discharge).

Master Mechanics - Master Mechanic

Cranes 150' – 180' - Boom & Jib 150 - 180 feet

Cranes 180' – 249' - Boom & Jib 180 - 249 feet

Cranes 250' and over - Boom & Jib 250-feet or over

Prevailing Wage Rate
Skilled Crafts

Name of Union: Operating Engineers - HevHwy Zone II

Change # : LCN01-2021sksLoc18hevhwyII

Craft : Operating Engineer **Effective Date :** 08/13/2021 **Last Posted :** 08/13/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Class A	$39.14		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$55.09	$74.66
Class B	$39.02		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$54.97	$74.48
Class C	$37.98		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$53.93	$72.92
Class D	$36.80		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$52.75	$71.15
Class E	$31.34		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.29	$62.96
Master Mechanic	$39.39		$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$55.34	$75.03
Apprentice	Percent											
1st Year	50.00	$19.57	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$35.52	$45.31
2nd Year	60.00	$23.48	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$39.43	$51.18
3rd Year	70.00	$27.40	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$43.35	$57.05
4th Year	80.00	$31.31	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.26	$62.92
Field Mech Trainee Class 2												
1st year	50.00	$19.57	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$35.52	$45.31
2nd year	60.00	$23.48	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$39.43	$51.18
3rd year	70.00	$27.40	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$43.35	$57.05
4th year	80.00	$31.31	$8.76	$6.25	$0.85	$0.00	$0.00	$0.09	$0.00	$0.00	$47.26	$62.92

Special Calculation Note : Other: Education & Safety Fund is $0.09 per hour.

Ratio :

For every (3) Operating Engineer Journeymen employed by the company, there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An Apprentice, while employed as part of a crew per Article VIII, paragraph 65 will not be subject to the apprenticeship ratios in this collective bargaining agreement

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS,

MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

**Apprentices wilt receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if they are required to have CDL.

Class A - Air Compressors on Steel Erection; Asphalt Plant Engineers (Cleveland District Only); Barrier Moving Machine; Boiler Operators, Compressor Operators, or Generators, when mounted on a rig; Boom Trucks (all types); Cableways; Cherry Pickers; Combination- Concrete Mixers & Towers; Concrete Plants (over 4 yd capacity); Concrete Pumps; Cranes (all types); Compact Cranes track or rubber over 4,000 pounds capacity; Cranes self-erecting stationary, track or truck; Derricks (all types); Draglines; Dredges dipper, clam or suction; Elevating Graders or Euclid Loaders; Floating Equipment (all types); Gradalls; Helicopter Crew (Operator- hoist or winch); Hoes (all types); Hoisting Engines; Hoisting Engines, on shaft or tunnel work; Hydraulic Gantry (lifting system); Industrial-type Tractors; Jet Engine Dryer (D8 or D9) diesel Tractors; Locomotives (standard gauge); Maintenance Operators/Technicians (class A); Mixers, paving (single or double drum); Mucking Machines; Multiple Scrapers; Piledriving Machines (all types); Power Shovels, Prentice Loader; Quad 9 (double pusher); Rail Tamper (with automatic lifting and aligning device); Refrigerating Machines (freezer operation); Rotary Drills, on caisson work; Rough Terrain Fork Lift with winch/hoist; Side Booms; Slip Form Pavers; Survey Crew Party Chiefs; Tower Derricks; Tree Shredders; Trench Machines (over 24" wide); Truck Mounted Concrete Pumps; Tug Boats; Tunnel Machines and /or Mining Machines; Wheel Excavators.
Class B - Asphalt Pavers; Automatic Subgrade Machines, self-propelled (CMI-type); Bobcat-type and /or Skid Steer Loader with hoe attachment greater than 7000 lbs.; Boring Machine Operators (more than 48 inches); Bulldozers; Concrete Saws, Vermeer type; Endloaders; Horizontal Directional Drill (50,000 ft. lbs. thrust and over); Hydro Milling Machine; Kolman-type Loaders (production type-dirt); Lead Greasemen; Lighting and Traffic Signal Installation Equipment includes all groups or classifications; Maintenance Operators/Technicians, Class B; Material Transfer Equipment (shuttle buggy) Asphalt; Pettibone-Rail Equipment; Power Graders; Power Scrapers; Push Cats; Rotomills (all), Grinders and Planners of all types, Groovers (excluding walk-behinds); Trench Machines (24 inch wide and under).

Class C - A-Frames; Air Compressors, on tunnel work (low Pressure); Articulating/straight bed end dumps if assigned (minus $4.00 per hour); Asphalt Plant Engineers (Portage and Summit Counties only); Bobcat-type and/or skid steer loader with or without attachments; Drones; Highway Drills (all types); HydroVac/Excavator (when a second person is needed, the rate of pay will be "Class E"); Locomotives (narrow gauge); Material Hoist/Elevators; Mixers, concrete (more than one bag capacity); Mixers, one bag capacity (side loader); Power Boilers (over 15 lbs. pressure); Pump Operators (installing or operating well Points); Pumps (4 inch and over discharge); Railroad Tie Inserter/Remover; Rollers, Asphalt; Rotovator (lime-soil Stabilizer); Switch & Tie Tampers (without lifting and aligning device); Utilities Operators, (small equipment); Welding Machines and Generators.
Class D – Backfillers and Tampers; Ballast Re-locator; Bar and Joint Installing Machines; Batch Plant Operators; Boring Machine Operators (48 inch or less); Bull Floats; Burlap and Curing Machines; Concrete

Plants (capacity 4 yds. and under); Concrete Saws (multiple); Conveyors (highway); Crushers; Deckhands; Farm type tractors, with attachments (highway); Finishing Machines; Firemen, Floating Equipment (all types); Fork Lifts (highway), except masonry; Form Trenchers; Hydro Hammers; Hydro Seeders; Pavement Breakers (hydraulic or cable); Plant Mixers; Post Drivers; Post Hole Diggers; Power Brush Burners; Power Form Handling Equipment; Road Widening Trenchers; Rollers (brick, grade, macadam); Self-Propelled Power Spreaders; Self-Propelled Sub-Graders; Steam Firemen; Survey Instrument men; Tractors, pulling sheepsfoot rollers or graders; Vibratory Compactors, with integral power.
Class E - Compressors (portable, Sewer, Heavy and Highway); Cranes-Compact, track or rubber under 4,000 pound capacity; Drum Firemen (asphalt plant); Fueling and greasing (Primary Operator with Specialized CDL Endorsement Add $3.00/hr); Generators; Inboard-Outboard Motor Boat Launches; Masonry Fork Lifts; Oil Heaters (asphalt plant); Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalperson; Survey Rodmen or Chairmen; Tire Repairmen; VAC/ALLS.
Master Mechanic - Master Mechanic

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 841

Change # : LCN01-2021sksLoc841

Craft : Painter Effective Date : 11/17/2021 Last Posted : 11/17/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Brush Roll	$28.18		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$43.53	$57.62
Paperhanger	$28.18		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$43.53	$57.62
Painter Spray Gun Operator Any and Al Coatings)	$29.03		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.38	$58.90
Swing Scaffold, Bosum Chair, & Window Jacks	$28.93		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.28	$58.75
Sandblast, Painting of Standpipes, etc. from Scaffolds Open Structural Steel, Standpipes and Water Towers	$29.43		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.78	$59.50
Epoxy Application	$28.83		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.18	$58.60
Synthetic Exterior, Lead Abatement, Asbestos Removal	$29.43		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.78	$59.50
Apprentice	**Percent**											
1st Year	53.24	$15.00	$6.85	$2.72	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$25.57	$33.07
2nd Year	60.00	$16.91	$6.85	$3.14	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$27.90	$36.35
3rd Year	70.00	$19.73	$6.85	$3.57	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$31.15	$41.01
4th Year	80.00	$22.54	$6.85	$4.34	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$34.73	$46.01

Special Calculation Note : Apprentice pay based on percentage of above appropriate classification.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, COSHOCTON, HOLMES, MEDINA, PORTAGE*, STARK, SUMMIT*, TUSCARAWAS, WAYNE

Special Jurisdictional Note : Summit Cnty: South of and including the Ohio Turnpike, Portage Cnty: North to and including the Ohio Turnpike

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 841 (Finisher/Taper)

Change # : LCN01-2021sksLoc841

Craft : Drywall Finisher **Effective Date :** 11/17/2021 **Last Posted :** 11/17/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Drywall Finisher/PainterTaper	$29.43		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$44.78	$59.50
Apprentice	Percent											
1st Year	50.98	$15.00	$6.85	$2.72	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$25.57	$33.08
2nd Year	65.00	$19.13	$6.85	$3.52	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$30.50	$40.06
3rd Year	80.00	$23.54	$6.85	$4.34	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$35.73	$47.51

Special Calculation Note : Apprentice pay based on percentage of above appropriate classification.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, COSHOCTON, HOLMES, MEDINA, PORTAGE*, STARK, SUMMIT*, TUSCARAWAS, WAYNE

Special Jurisdictional Note : Summit County South of and including the Ohio Turnpike, Portage Cnty: North of and including the Ohio Turnpike

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 841 Bridge Painter

Change # : LCN01-2021sksLoc841

Craft : Painter Effective Date : 11/17/2021 Last Posted : 11/17/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Bridge Blaster Class 1	$37.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$53.20	$72.12
Class 2 Bridge Painter, Rigger, Containment Builder, Spot Blaster	$34.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$50.20	$67.62
Class 3 Equipment Operator/Field Mechanic, Grit Reclamation, Paint Mixer, Traffic Control, Boat Person, Dive (0-5 Years Exp)	$27.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$43.20	$57.13
Class 3 Equipment Operator/Field Mechanic, Grit Reclamation, Paint Mixer, Traffic Control, Boat Person, Dive (5 plusYears Exp).	$30.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$46.20	$61.63
Class 4 Concrete Sealing, Concrete Blasting/Power Washing/Etc.	$30.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$46.20	$61.63
Class 5 Quality Control/QualityAssurance Traffic Safety, Competent Person.	$30.85		$6.85	$7.50	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$46.20	$61.63
Apprentice	**Percent**											
1st Year	50.01	$18.93	$6.85	$2.72	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$29.50	$38.96
2nd Year	60.00	$22.71	$6.85	$3.14	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$33.70	$45.06
3rd year	70.00	$26.50	$6.85	$3.57	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$37.92	$51.16
4th Year	80.00	$30.28	$6.85	$4.34	$0.35	$0.00	$0.65	$0.00	$0.00	$0.00	$42.47	$57.61

Special Calculation Note : Apprentice pay based on percentage of above appropriate classification.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

CARROLL, COSHOCTON, HOLMES, MEDINA, PORTAGE*, STARK, SUMMIT*, TUSCARAWAS, WAYNE

Special Jurisdictional Note : Summit County: South of and including the Ohio Turnpike, Portage County: North to and including the Ohio Turnpike

Details :

Class 1 – Abrasive blasting of any kind
Class 2 – Bridge painting, coating applications of any kind. All steel surface preparation other than abrasive blasting. All necessary rigging and containment building and all remedial/ spot blasting.
Class 3 – Tend to all equipment including but not limited to abrasive blasting, power washing, spray painting, forklifts, hoists, truck, etc. Load and unloading trucks, handle materials, man safety boats, handle traffic control, clean up/ vacuum abrasive blast materials and related tasks.
Class 4 – All aspects of concrete coating/ sealing including but not limited to preparation, containment, etc.
Class 5 – Verify and record that all work is completed according to job specifications. Assure that all health and safety standards are adhered to. Assure all traffic is safely handled.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639

Change # : LCNO1-2015fbLoc639

Craft : Painter Effective Date : 06/10/2015 Last Posted : 06/10/2015

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Metal Polisher											
Top Helper Class A	$19.09	$3.65	$0.00	$0.00	$0.66	$0.00	$0.00	$0.00	$0.00	$23.40	$32.94
Top Helper Class B	$19.09	$3.65	$0.65	$0.00	$1.03	$0.00	$0.37	$0.00	$0.00	$24.79	$34.33
Top Helper Class C	$19.09	$3.65	$1.00	$0.00	$1.76	$0.00	$0.37	$0.00	$0.00	$25.87	$35.41
Helper Class A	$14.69	$3.65	$0.00	$0.00	$0.51	$0.00	$0.00	$0.00	$0.00	$18.85	$26.19
Helper Class B	$14.69	$3.65	$0.65	$0.00	$0.79	$0.00	$0.28	$0.00	$0.00	$20.06	$27.40
Helper Class C	$14.69	$3.65	$1.00	$0.00	$1.64	$0.00	$0.28	$0.00	$0.00	$21.26	$28.60
New Hire 90 Days	$11.00	$3.65	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$14.65	$20.15

Special Calculation Note : Other is Sick and Personal Time

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION,

VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Top Helper: Shall perform the responsibilities of a Helper and be responsible for the setup, break down, safety and quality of the company's product.

Helper : Shall be responsible for performing tasks in refinishing, compliance with safety procedures, setting up and breaking down job sites, scaffolding and swing stages and preparing surfaces for refinishing including but not limited to, masking and stripping and cleaning, oxidizing, polishing and scratch removal on various surfaces

.

Class A Workers: Less than 1 Year of Service.
Class B Workers: More than 1 and less than 8 Years of Service.
Class C Workers: More than 8 Years of Service.

Metal Polisher Scope of Work: Polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, nickel, aluminum and stainless steel and in mental specialty work, various stone finishes, stone specialty work and any other work pertaining to the finishing of metal, stones, woods, and any window washing/cleaning done in conjunction with this work, using chemicals, solvents, coatings and hand applied lacquer thinner, removing scratches from mirrow finished metals, burnishing of bronze, statuary finishes on exterior and interior surfaces and the use of all tools required to perform such work, including but not limited to polishes, spray equipment and scaffolding.

Swing State Rate: All work on scaffold 4 sections or higher, including any boom lifts and swing stage scaffolds including the rigging and derigging of hanging/suspended swing stage systems and rappelling/bolson chair work, ADD $1.50 per hour.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639 (A) Sign

Change # : CN01-2009Loc639A

Craft : Painter Effective Date : 03/06/2009 Last Posted : 03/06/2009

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Sign Erector	$19.98		$4.46	$1.00	$0.25	$1.68	$0.00	$0.00			$27.37	$37.36
Serviceman	$19.98		$4.46	$1.00	$0.25	$1.68	$0.00	$0.00			$27.37	$37.36
Metal Sign Fabricator	$19.98		$4.46	$1.00	$0.25	$1.68	$0.00	$0.00			$27.37	$37.36
Neon Bender Pattern Maker	$19.98		$4.46	$1.00	$0.25	$1.68	$0.00	$0.00			$27.37	$37.36
Computer Operator	$18.98		$4.46	$1.00	$0.25	$1.61	$0.00	$0.00			$26.30	$35.79
Router	$18.98		$4.46	$1.00	$0.25	$1.61	$0.00	$0.00			$26.30	$35.79
Plastic Wood Fabricator	$18.98		$4.46	$1.00	$0.25	$1.61	$0.00	$0.00			$26.30	$35.79
Vinyl Applicator	$18.98		$4.46	$1.00	$0.25	$1.61	$0.00	$0.00			$26.30	$35.79
Apprentice For Sign Service, Metal,Neon,Pattern	**Percent**											
1000 hrs	50.00	$9.99	$4.46	$1.00	$0.25	$1.03	$0.00	$0.00			$16.73	$21.73
2000 hrs	55.00	$10.99	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$17.07	$22.56
3000 hrs	60.00	$11.99	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$18.07	$24.06
4000 hrs	65.00	$12.99	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$19.07	$25.56
5000 hrs	70.00	$13.99	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$20.07	$27.06
6000 hrs	85.00	$16.98	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$23.06	$31.55
7000 hrs	90.00	$17.98	$4.46	$1.00	$0.25	$0.37	$0.00	$0.00			$24.06	$33.05

Special Calculation Note : Apprentice Rates For: Computer Operator, Router, Plastic-Wood Fabricator Vinyl Application

1000 hrs 50% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.99
2000 hrs 55% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37
3000 hrs 65% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37

4000 hrs 50% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37
5000 hrs 70% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37
6000 hrs 85% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37
7000 hrs 90% plus ($4.46 h&w)+($1.00 pension)+($.25 apprentice training) + vacation $0.37

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ASHLAND, ASHTABULA, CUYAHOGA, ERIE, GEAUGA, LAKE, LORAIN, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT

Special Jurisdictional Note :

Details :
Sign and display work shall include but not limited: to the making and installation of all signs and servicing of the same, lettering and pictorial work of any kind, including vinyl signs and vinyl substrates and the preparing for the finishing of same, be it by hand, brush, roller,spray, mechanical or computer aided and by any other method or process pertaining to same: they shall have control of all branches, methods and processes of screen process work: tube bending and display work such as creating, building and finishing of all display matter and its related operations used for advertising purposes, including all lettering whether it be done by hand, mechanical or computer aided or by any other method or process pertaining to same: the construction, erection and maintenance of all billboards and all communication advertising.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639 Zone 2 Sign

Change # : LCN01-2016fbLoc639

Craft : Painter Effective Date : 08/03/2016 Last Posted : 08/03/2016

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Sign Journeyman Tech/Team Leader Class A	$21 25	$1.33	$0.14	$0.00	$0.00	$0.00	$0.57	$0.00	$0.00	$23.29	$33.92
Painter Sign Journeyman Tech/Team Leader Class B	$21.25	$1.33	$0.14	$0.00	$0.41	$0.00	$0.57	$0.00	$0.00	$23.70	$34.32
Painter Sign Journeyman Tech/Team Leader Class C	$21 25	$1.33	$0.14	$0.00	$0.82	$0.00	$0.57	$0.00	$0.00	$24.11	$34.74
Painter Sign Journeyman Tech/Team Leader Class D	$21 25	$1.33	$0.14	$0.00	$1.23	$0.00	$0.57	$0.00	$0.00	$24.52	$35.14
Sign Journeyman Class A	$20.98	$1.33	$0.14	$0.00	$0.00	$0.00	$0.56	$0.00	$0.00	$23.01	$33.50
Sign Journeyman Class B	$20.98	$1.33	$0.14	$0.00	$0.40	$0.00	$0.56	$0.00	$0.00	$23.41	$33.90
Sign Journeyman Class C	$20.98	$1.33	$0.14	$0.00	$0.81	$0.00	$0.56	$0.00	$0.00	$23.82	$34.31
Sign Journeyman Class D	$20.98	$1.33	$0.14	$0.00	$1.21	$0.00	$0.56	$0.00	$0.00	$24.22	$34.71
Tech Sign Fabrication/ Erector Class A	$15.90	$1.33	$0.14	$0.00	$0.00	$0.00	$0.43	$0.00	$0.00	$17.80	$25.75
Tech Sign Fabrication/ Erector Class B	$15.90	$1.33	$0.14	$0.00	$0.31	$0.00	$0.43	$0.00	$0.00	$18.11	$26.06
Tech Sign Fabrication/ Erector Class C	$15.90	$1.33	$0.14	$0.00	$0.61	$0.00	$0.43	$0.00	$0.00	$18.41	$26.36
Tech Sign Fabrication/ Erector	$15.90	$1.33	$0.14	$0.00	$0.92	$0.00	$0.43	$0.00	$0.00	$18.72	$26.67

Class D												

Special Calculation Note : Other is for paid holidays.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, AUGLAIZE, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GREENE, HAMILTON, HANCOCK, HARDIN, HENRY, HIGHLAND, HOLMES, HURON, JACKSON, KNOX, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MERCER, MIAMI, MONTGOMERY, MORROW, MUSKINGUM, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, WARREN, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :
Class A: less that 1 year.
Class B: 1-3 years.
Class C; 3-10 years.
Class D: More than 10 years.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639 (Cleveland Area) Sign

Change # : CN01-2006Loc639Cleve

Craft : Painter Effective Date : 01/03/2006 Last Posted : 01/03/2006

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Sign	$20.20		$3.13	$3.25	$0.20	$1.96	$0.00	$0.00			$28.74	$38.84
Apprentice	Percent											
1000 hrs	40.00	$8.08	$3.13	$3.25	$0.20	$1.07	$0.00	$0.00			$15.73	$19.77
2000 hrs	50.00	$10.10	$3.13	$3.25	$0.20	$1.22	$0.00	$0.00			$17.90	$22.95
3000 hrs	60.00	$12.12	$3.13	$3.25	$0.20	$1.37	$0.00	$0.00			$20.07	$26.13
4000 hrs	70.00	$14.14	$3.13	$3.25	$0.20	$1.51	$0.00	$0.00			$22.23	$29.30
5000 hrs	75.00	$15.15	$3.13	$3.25	$0.20	$1.59	$0.00	$0.00			$23.32	$30.89
6000 hrs	80.00	$16.16	$3.13	$3.25	$0.20	$1.66	$0.00	$0.00			$24.40	$32.48
7000 hrs	85.00	$17.17	$3.13	$3.25	$0.20	$1.74	$0.00	$0.00			$25.49	$34.07
8000 hrs	90.00	$18.18	$3.13	$3.25	$0.20	$1.81	$0.00	$0.00			$26.57	$35.66

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ALLEN, ASHLAND, ASHTABULA, AUGLAIZE, BELMONT, CARROLL, CHAMPAIGN, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DEFIANCE, ERIE, FULTON, GEAUGA, GUERNSEY, HANCOCK, HARDIN, HARRISON, HENRY, HOLMES, HURON, JEFFERSON, KNOX, LAKE, LOGAN, LORAIN, LUCAS, MAHONING, MARION, MEDINA,

MERCER, MONROE, MORROW, NOBLE, OTTAWA, PAULDING, PIKE, PORTAGE, PUTNAM, RICHLAND, SANDUSKY, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, VAN WERT, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Painter Local 639 (D) Sign

Change # : CN01-2005Loc639D

Craft : Painter Effective Date : 12/12/2005 Last Posted : 12/12/2005

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Sign Erector	$15.25		$3.65	$1.45	$0.10	$1.34	$0.00	$0.00			$21.79	$29.41
Sign Fabricator	$15.25		$3.65	$1.45	$0.10	$1.34	$0.00	$0.00			$21.79	$29.41
Serviceman	$15.25		$3.65	$1.45	$0.10	$1.34	$0.00	$0.00			$21.79	$29.41
Apprentice	Percent											
0-6 Months	60.00	$9.15	$3.65	$1.45	$0.10	$0.94	$0.00	$0.00			$15.29	$19.87
6-12 Months	65.00	$9.91	$3.65	$1.45	$0.10	$0.99	$0.00	$0.00			$16.10	$21.06
12-18 Months	70.00	$10.67	$3.65	$1.45	$0.10	$1.04	$0.00	$0.00			$16.91	$22.25
18-24 Months	75.00	$11.44	$3.65	$1.45	$0.10	$1.09	$0.00	$0.00			$17.73	$23.45
24-30 Months	80.00	$12.20	$3.65	$1.45	$0.10	$1.14	$0.00	$0.00			$18.54	$24.64
30-36 Months	85.00	$12.96	$3.65	$1.45	$0.10	$1.19	$0.00	$0.00			$19.35	$25.83
36-42 Months	90.00	$13.73	$3.65	$1.45	$0.10	$1.24	$0.00	$0.00			$20.16	$27.03
42-48 Months	95.00	$14.49	$3.65	$1.45	$0.10	$1.29	$0.00	$0.00			$20.98	$28.22

Special Calculation Note : Add .75 cents increase per hour for high pay over 40 feet.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

3 Journeymen to 1 Apprentice	CARROLL, COSHOCTON, HOLMES, KNOX, STARK, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Plumber Pipefitter Local 94

Change # : LCN01-2020fbLoc94

Craft : Plumber/Pipefitter Effective Date : 06/04/2020 Last Posted : 06/04/2020

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plumber Pipefitter	$35.78		$8.58	$5.94	$0.77	$0.00	$6.05	$0.19	$0.00	$0.00	$57.31	$75.20
Apprentice Hired After 05-01-2017												
1st Year	$14.31		$8.58	$0.00	$0.77	$0.00	$3.03	$0.19	$0.00	$0.00	$26.88	$34.03
2nd Year	$17.89		$8.58	$0.50	$0.77	$0.00	$3.03	$0.19	$0.00	$0.00	$30.96	$39.91
3rd Year	$21.47		$8.58	$0.50	$0.77	$0.00	$2.69	$0.19	$0.00	$0.00	$34.20	$44.93
4th Year	$25.05		$8.58	$0.74	$0.77	$0.00	$4.23	$0.19	$0.00	$0.00	$39.56	$52.09
5th Year	$28.62		$8.58	$0.75	$0.77	$0.00	$4.23	$0.19	$0.00	$0.00	$43.14	$57.45
Apprentice If Hired Before 5-01-2017	**Percent**											
5th 6 months	60.00	$21.47	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$33.30	$44.03
6th 6 months	65.00	$23.26	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$35.09	$46.72
7th 6 months	75.00	$26.83	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$38.67	$52.08
8th 6 months	80.00	$28.62	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$40.45	$54.77
9th 6 months	85.00	$30.41	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$42.24	$57.45
10th 6 monthsr	90.00	$32.20	$8.58	$0.50	$0.77	$0.00	$1.79	$0.19	$0.00	$0.00	$44.03	$60.13

Special Calculation Note : Other is Industry and International Training Fund.

Ratio :

1 Journeymen to 2 Apprentice
4 Journeymen to 3 Apprentice
6 Journeymen to 4 Apprentice
9 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :
CARROLL*, STARK, WAYNE

3 Journeyman to 1 Apprentice Thereafter

Special Jurisdictional Note : In Carroll County the following townships are included: Ross, Monroe, Union, Lee, Orange, Perry and London.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Plumber Pipefitter Local 94

Change # : LCN01-2021sksLoc94

Craft : Plumber/Pipefitter **Effective Date :** 11/24/2021 **Last Posted :** 11/24/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plumber Pipefitter	$36.33		$8.83	$6.19	$0.77	$0.00	$6.30	$0.10	$0.00	$0.00	$58.52	$76.68
Apprentice Hired After 05-01-2017												
1st Year	$14.53		$8.83	$0.00	$0.77	$0.00	$3.15	$0.10	$0.00	$0.00	$27.38	$34.65
2nd Year	$18.17		$8.83	$0.50	$0.77	$0.00	$3.15	$0.10	$0.00	$0.00	$31.52	$40.61
3rd Year	$21.80		$8.83	$0.50	$0.77	$0.00	$3.15	$0.10	$0.00	$0.00	$35.15	$46.05
4th Year	$25.43		$8.83	$0.50	$0.77	$0.00	$4.73	$0.10	$0.00	$0.00	$40.36	$53.07
5th Year	$29.06		$8.83	$0.50	$0.77	$0.00	$4.55	$0.10	$0.00	$0.00	$43.81	$58.34
Apprentice If Hired Before 5-01-2017	**Percent**											
5th yr 1st 6mos	85.00	$30.88	$8.83	$0.50	$0.77	$0.00	$1.82	$0.10	$0.00	$0.00	$42.90	$58.34
5th yr 2nd 6 months	90.00	$32.70	$8.83	$0.50	$0.77	$0.00	$1.82	$0.10	$0.00	$0.00	$44.72	$61.07

Special Calculation Note : Other is International Training Fund.

Ratio :

1 Journeymen to 2 Apprentice
4 Journeymen to 3 Apprentice
6 Journeymen to 4 Apprentice
9 Journeymen to 5 Apprentice
11 Journeyman to 6 Apprentice

3 Journeyman to 1 Apprentice Thereafter

Jurisdiction (* denotes special jurisdictional note) :
CARROLL*, STARK, WAYNE

Special Jurisdictional Note : In Carroll County the following townships are included: Ross, Monroe, Union, Lee, Orange, Perry and London.

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Roofer Local 88

Change # : LCN01-2021fbLoc88

Craft : Roofer **Effective Date :** 06/09/2021 **Last Posted :** 06/09/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Roofer	$27.47		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$48.25	$61.99
HELPERS												
Helper -500 Hrs. 1st 6 months	$15.38		$2.25	$0.00	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$19.71	$27.40
Helper - 500 Hrs. 2nd 6 months	$17.03		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$37.81	$46.33
2nd year Helper	$18.68		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$39.46	$48.80
3rd year Helper	$20.33		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$41.11	$51.27
4th year Helper	$21.98		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$42.76	$53.75
5th year Helper	$23.62		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$44.40	$56.21
6th year Helper	$25.27		$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$46.05	$58.69
Apprentice	**Percent**											
1st 6 months w/500 hrs	56.00	$15.38	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$36.16	$43.85
2nd 6 months w/500 hrs	62.00	$17.03	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$37.81	$46.33
3rd 6 months w/500 hrs	68.00	$18.68	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$39.46	$48.80
4th 6 months w/500 hrs	74.00	$20.33	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$41.11	$51.27
5th 6 months w/500 hrs	80.00	$21.98	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$42.76	$53.74

6th 6 months w/500 hrs	86.00	$23.62	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$44.40	$56.22
7th 6 months w/500 hrs	92.00	$25.27	$8.90	$9.80	$0.40	$0.00	$1.50	$0.18	$0.00	$0.00	$46.05	$58.69

Special Calculation Note : Roofers working in any form of coal tar pitch, whether hot or cold, installing and/or removing will be paid $.25 more per hour.
Other $0.18 is for C.I.D.B.

Ratio :

No helper shall be used on any one job unless 1 Journeymen, and 1 Apprentices are working on said job .One
(1) Journeymen to One (1) Apprentice to One (1) Helper

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COSHOCTON, CRAWFORD, HOLMES, HURON, LORAIN*, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TUSCARAWAS, WAYNE

Special Jurisdictional Note : In Lorain County (South of the Turnpike)

Details :

Prevailing Wage Rate
Skilled Crafts

Name of Union: Sheet Metal Local 33 (Akron)

Change # : LCN02-2021fbLoc33Akron

Craft : Sheet Metal Worker Effective Date : 08/01/2021 Last Posted : 07/28/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sheet Metal Worker	$32.65		$9.00	$13.04	$0.93	$0.00	$7.20	$0.00	$0.00	$0.00	$62.82	$79.14
Industrial Door	$23.36		$8.27	$5.44	$0.17	$0.00	$2.15	$0.00	$0.00	$0.00	$39.39	$51.07
Apprentice Helper Trainee												
1st 60 Days Probationary Period	$12.15		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$12.15	$18.23
61 days-12 Months	$13.55		$8.27	$1.88	$0.17	$0.00	$1.41	$0.00	$0.00	$0.00	$25.28	$32.06
2nd Year	$15.89		$8.27	$1.88	$0.17	$0.00	$1.59	$0.00	$0.00	$0.00	$27.80	$35.75
3rd Year	$17.05		$8.27	$1.88	$0.17	$0.00	$1.69	$0.00	$0.00	$0.00	$29.06	$37.59
4th Year	$18.69		$8.27	$1.88	$0.17	$0.00	$1.80	$0.00	$0.00	$0.00	$30.81	$40.16
5th Year	$20.09		$8.27	$1.88	$0.17	$0.00	$1.91	$0.00	$0.00	$0.00	$32.32	$42.37
Apprentice	**Percent**											
Apprentice												
1st year	45.00	$14.69	$9.00	$3.54	$0.17	$0.00	$0.00	$0.00	$0.00	$0.00	$27.40	$34.75
2nd year	50.00	$16.32	$9.00	$3.93	$0.93	$0.00	$3.60	$0.00	$0.00	$0.00	$33.78	$41.95
3rd year	55.00	$17.96	$9.00	$4.32	$0.93	$0.00	$3.60	$0.00	$0.00	$0.00	$35.81	$44.79
4th year	65.00	$21.22	$9.00	$5.11	$0.93	$0.00	$3.60	$0.00	$0.00	$0.00	$39.86	$50.47
5th year	80.00	$26.12	$9.00	$6.29	$0.93	$0.00	$3.60	$0.00	$0.00	$0.00	$45.94	$59.00

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Apprentice
2 Journeymen to 1 Apprentice
3 Journeymen to 2 Apprentice
4 Journeymen to 2 Apprentice
5-7 Journeymen to 3 Apprentice
8-10 Journeymen to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, CARROLL, COSHOCTON, CRAWFORD, HOLMES, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TUSCARAWAS, WAYNE

11-13 Journeymen to 5 Apprentice
14, 15 Journeymen to 6 Apprentice
and maintaining a three to one apprentice ratio
thereafter.

Special Jurisdictional Note :

Details :

Scope of Work: This Agreement covers the rates of pay and conditions of employment of all employees of the Employer engaged in, but not limited to, the a) manufacture, fabrication, assembling, handling, erection, installation, dismantling, conditioning, adjustment, alteration, repairing and servicing of all ferrous or non-ferrous metal work and all other materials used in lieu thereof and of all HVAC systems, air-veyor systems, exhaust systems, and air handling systems regardless of material used, including the setting of all equipment and all reinforcements in connection therewith; (b) all lagging over insulation and all duct-lining; (c) testing, servicing, and balancing of all air-handling equipment and duct work; (d) the preparation of all shop and field sketches, whether manually drawn or computer assisted, used in fabrication and erection, including those taken from original architectural and engineering drawings or sketches, and (e) metal roofing; and (f) all other work included in the jurisdictional claims of Sheet Metal Worker's International Association.
Industrial Door-Installation and service of overhead doors roll up doors, docks and dock leveling.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Sheet Metal Local 33 (Akron) Decking

Change # : CN01-2009Loc33(Akron)Deck

Craft : Sheet Metal Worker Effective Date : 09/24/2009 Last Posted : 09/24/2009

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sheet Metal Worker Decking & Siding	$20.06		$6.31	$6.35	$0.38	$0.00	$0.00	$0.98			$34.08	$44.11
Decking & Siding Specialty Trainees	Percent											
1st 30 days	64.25	$12.89	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00			$12.89	$19.33
2nd thru 6th months	64.25	$12.89	$6.31	$6.35	$0.00	$0.00	$0.00	$0.00			$25.55	$31.99
7th thru 12th months	64.28	$12.89	$6.31	$6.35	$0.38	$0.00	$0.00	$0.98			$26.91	$33.36
2nd year	78.56	$15.76	$6.31	$6.35	$0.38	$0.00	$0.00	$0.98			$29.78	$37.66

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

3 Journeymen To 1 Apprentice	ASHLAND, CARROLL, COSHOCTON, CRAWFORD, HOLMES, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TUSCARAWAS, WAYNE

Special Jurisdictional Note :

Details :

Work but not limited to:Exterior application of manufactured and/or job site fabricated metal decking, siding and exterior appurtenances thereto. The erection of pre-engineered metal buildings, pre-manufactured gas stations and appurtenances thereto. The installation of metal roofs and appurtenances. The erection and/or job site fabrication of draft or fire curtains and appurtenances thereto.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Sprinkler Fitter Local 669

Change # : LCN01-2022sksLoc669

Craft : Sprinkler Fitter **Effective Date :** 01/05/2022 **Last Posted :** 01/05/2022

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sprinkler Fitter	$41.87		$10.99	$7.10	$0.52	$0.00	$5.12	$0.00	$0.00	$0.00	$65.60	$86.53
Apprentice Indentured after April 1, 2013	Percent											
ClLASS 1	45.00	$18.84	$7.85	$0.00	$0.52	$0.00	$0.00	$0.00	$0.00	$0.00	$27.21	$36.63
CLASS 2	50.02	$20.94	$7.85	$0.00	$0.52	$0.00	$0.00	$0.00	$0.00	$0.00	$29.31	$39.79
CLASS 3	54.40	$22.78	$10.99	$7.10	$0.52	$0.00	$1.15	$0.00	$0.00	$0.00	$42.54	$53.93
CLASS 4	59.40	$24.87	$10.99	$7.10	$0.52	$0.00	$1.15	$0.00	$0.00	$0.00	$44.63	$57.07
CLASS 5	64.42	$26.97	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$46.98	$60.47
CLASS 6	69.41	$29.06	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$49.07	$63.60
CLASS 7	74.40	$31.15	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$51.16	$66.74
CLASS 8	79.42	$33.25	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$53.26	$69.89
CLASS 9	84.40	$35.34	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$55.35	$73.02
CLASS 10	89.40	$37.43	$10.99	$7.10	$0.52	$0.00	$1.40	$0.00	$0.00	$0.00	$57.44	$76.16

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW,

MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Sprinkler Fitter work shall consist of the installation,dismantling,maintenance,repairs,adjustments,and corrections of all fire protection and fire control systems including the unloading,handling by hand,power equipment and installation of all piping or tubing,appurtenances and equipment pertaining thereto,including both overhead and underground water mains,fire hydrants and hydrant mains,standpipes and hose connections to sprinkler systems used in connection with sprinkler and alarm systems. Also all tanks and pumps connected thereto,also included shall be CO-2 and Cardox Systems, Dry Chemical Systems,Foam Systems and all other fire protection systems.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 1
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCRO1-2021fbBldgHevHwy

Craft : Truck Driver Effective Date : 05/21/2021 Last Posted : 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 1 4 wheel service, dump, and batch trucks, Oil Distributor - Asphalt Distributor-Tandems	$29.24		$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$45.44	$60.06
Apprentice	Percent											
First 6 months	80.00	$23.39	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$39.59	$51.29
7-12 months	85.00	$24.85	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$41.05	$53.48
13-18 months	90.00	$26.32	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$42.52	$55.67
19-24 months	95.00	$27.78	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$43.98	$57.87
25-30 months	100.00	$29.24	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$45.44	$60.06

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN,

HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive $0.20 cents per hour above their Basic Hourly Rate.

Prevailing Wage Rate
Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 2
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCRO1-2021fbBldgHevHwy

Craft : Truck Driver Effective Date : 05/21/2021 Last Posted : 05/21/2021

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 2 Tractor Trailer-Semi Tractor Trucks-Pole Trailers-Ready Mix Trucks-Fuel Trucks-Asphalt-Oil Spray bar men- 5 Axle & Over -Belly Dumps-End Dumps-Articulated Dump Trucks- Low boys-Heavy duty Equipment(irrespective of load carried) when used exclusively for transportation-Truck Mechanics (when needed)	$29.66		$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$45.86	$60.69
Apprentice	**Percent**											
First 6 months	80.00	$23.73	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$39.93	$51.79
7-12 months	85.00	$25.21	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$41.41	$54.02
13-18 months	90.00	$26.69	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$42.89	$56.24
19-24 months	95.00	$28.18	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$44.38	$58.47
25-30 months	100.00	$29.66	$7.50	$8.50	$0.20	$0.00	$0.00	$0.00	$0.00	$0.00	$45.86	$60.69

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN,

HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive $0.20 cents per hour above their Basic Hourly Rate.

(SAMPLE COPY)
Waste Disposal Agreement for Projects in the City of Canton

Items 1, 3 - 9 are optional and discretionary to the undersigned

THIS WASTE AGREEMENT, made this _____ day of _____ 20___ , by and between _____ (called "Contractor"), and _____ of _____ (called "Land Owner"), concerning a certain construction contract between the Contractor and _____ in the City of Canton, OH for the _____ (project), as follows:

1. MANNER OF WASTING: Land Owner grants to Contractor the exclusive right to place dirt, earth, rock, topsoil, subsurface, unsuitable and/or other excess material (called "waste material") upon the area described in the following paragraph without requirement, limit, or restriction as to depth, amount, manner, or time.
2. WASTE AREA: The property upon which Contractor is permitted to place material is commonly known as _____ (address).
3. TITLE TO WASTE AREA: The Land Owner warrants that it has title to and the right to contract for placement of waste material in said area and agrees to defend and indemnify Contractor against any claim, suit, or damage arising out of such title or right to contract.
4. ACCESS AND USE: Land Owner hereby grants Contractor the right of ingress and egress to the waste area in locations to be selected by Contractor for all purposes necessary to the complete fulfillment of this agreement, and the right of quiet enjoyment in the intended use of such area.
5. PAYMENT: Contractor agrees to pay and Land Owner agrees to accept as full and final compensation for all rights granted and covenants contained herein and all claims of every nature the sum of _____ payable _____ .
6. BASIS OF MEASUREMENTS: It is mutually agreed that measurement of the amount of materials wasted, where required, shall be made on the following basis: _____ and said measurement shall be binding upon the parties hereto for all purposes.
7. DAMAGES: Land Owner hereby waives any and all claims for damage to the waste area and to the area of ingress and egress except as specifically noted herein.
8. RELEASE: Upon receipt of final payment hereunder, and provided all terms of this agreement have been fulfilled, Land Owner hereby releases Contractor from further liability of any kind or nature hereunder.

WITNESSES:

_____

_____

_____

_____

CONTRACTOR:

_____
Authorized Signature & Title

LANDOWNER:

_____
Signature

9. ENTIRE AGREEMENT: It is agreed that the terms and conditions of this agreement are fully covered in the foregoing, and that any oral or written statements made by either party, or agents claiming to represent either party, not set forth herein, are not binding on the parties and are not considered as part of this Agreement.
10. DISCLAIMER: The City of Canton is not a party to the here above agreement. The Contractor and Landowner shall indemnify and save harmless the City of Canton from any claim that may arise from the here above agreement. The waste material is the property of the Contractor, not the City of Canton.

COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND
ADMINISTRATION OFFICES RENOVATION

CITY OF CANTON

2901 REGENT AVENUE NE CANTON, OH 44705

ISSUED FOR BID: FEBRUARY 24, 2022

PROJECT DATA - OBC (2017):

ADDITION AND INTERIOR REMODEL OF 1-STORY MASONRY AND STEEL BUILDING

TYPE OF CONSTRUCTION: II-B

USE GROUP CLASSIFICATION: S-2 (STORAGE - LOW HAZARD)
B (BUSINESS)

BUILDING SHALL BE CONSIDERED AS NON-SEPARATED MIXED-USE.
NO FIRE-RATED WALL / FLOOR / CEILING ASSEMBLIES ARE REQUIRED BETWEEN DIFFERING OCCUPANCY TYPES

ALLOWABLE BUILDING AREA
PER TABLE 506.2: 92,000 SF (B MOST RESTRICTIVE)

EXISTING BUILDING AREA: 26,295 SF

NEW ADDITION: 10,630 SF

TOTAL: 36,925 SF

EXISTING BUILDING AND NEW ADDITION SHALL BE EQUIPPED WITH AN AUTOMATIC FIRE SUPPRESSION SYSTEM.

CALCULATED OCCUPANCY:

OFFICE AREA:	5,775 SF	57 PERSONS
GARAGE AREA:	31,150 SF	62 PERSONS
MEZZANINE:	2,250 SF	4 PERSONS
TOTAL:		163 PERSONS

ACTUAL OCCUPANCY:

OFFICE AREA:	5,775 SF	40 PERSONS
GARAGE AREA:	31,150 SF	36 PERSONS
MEZZANINE:	2,250 SF	4 PERSONS
TOTAL:		80 PERSONS

PLUMBING FIXTURE REQUIREMENTS:

B (BUSINESS) AREA:	57 PERSONS	
MEN'S	29 PERSONS	(1) WC; (1) URINAL; (1) LAV
WOMEN'S	28 PERSONS	(1) WC; (1) LAV
S-2 (STORAGE) AREA:	62 PERSONS	
MEN'S	31 PERSONS	(1) WC; (1) URINAL; (1) LAV
WOMEN'S	31 PERSONS	(1) WC; (1) LAV
TOTAL REQUIRED FIXTURES:		
MEN'S		(2) WC; (2) URINALS; (2) LAVS
WOMEN'S		(2) WC; (2) LAVS
		(1) SERVICE SINK
		(1) DRINKING FOUNTAIN
TOTAL PROVIDED FIXTURES:		
MEN'S		(3) WC; (3) URINALS; (3) LAVS
WOMEN'S		(3) WC; (3) LAVS
		(2) SERVICE SINK
		(1) DRINKING FOUNTAIN

Ohio Utilities Protection Service
Call 811 before you dig

MOTTER & MEADOWS
ARCHITECTS
600 MARKET AVENUE NORTH
CANTON, OHIO 44702
PHONE: (330) 454-6165

CIVIL ENGINEER: KARPINSKI ENGINEERING
STRUCTURAL ENGINEER: BARBER & HOFFMAN INC
MEP ENGINEER: KARPINSKI ENGINEERING

VICINITY MAP / AREA OF WORK LOCATION PLAN

ABBREVIATIONS

ACOUS.	ACOUSTICAL	INSUL.	INSULATION
A.F.F.	ABOVE FINISH FLOOR	JT.	JOINT
ALUM.	ALUMINUM	MANFR.	MANUFACTURER (ALSO 'MFR.')
@	AT	M.C.	MECHANICAL CONTRACTOR
BD.	BOARD	M.H.	MANHOLE
BRG.	BEARING	M.O.	MASONRY OPENING
BLK.	BLOCK	MFG.	MANUFACTURING
BLKG.	BLOCKING	MAX.	MAXIMUM
CLG.	CEILING	MECH.	MECHANICAL
℄	CENTERLINE	MTL.	METAL
COL.	COLUMN	MIN.	MINIMUM
CONC.	CONCRETE	NOM.	NOMINAL
CONT.	CONTINUOUS	N.I.C.	NOT IN CONTRACT
C.J.	CONTROL JOINT	N.T.S.	NOT TO SCALE
DET.	DETAIL	O/	ON OR OVER
DIA.	DIAMETER	O.C.	ON CENTER
D.S.	DOWNSPOUT	P.C.	PLUMBING CONTRACTOR
DWGS.	DRAWINGS	PL. LAM.	PLASTIC LAMINATE (ALSO 'P.L.')
EA.	EACH	PLUMB.	PLUMBING
E.C.	ELECTRICAL CONTRACTOR	±	PLUS OR MINUS
ELEC.	ELECTRICAL	℘	PROPERTY LINE
E.T.R.	EXISTING TO REMAIN	REINF.	REINFORCING
E.W.	EACH WAY	R	RISER
E.W.C.	ELECTRIC WATER COOLER	R.D.	ROOF DRAIN
ELEV.	ELEVATION (ALSO 'EL.')	R.O.	ROUGH OPENING
EXIST.	EXISTING (ALSO 'EXG.')	SIM.	SIMILAR
EXP.	EXPANSION	SPECS.	SPECIFICATIONS
E.J.	EXPANSION JOINT	S.S.	STAINLESS STEEL
F.F.	FINISH FLOOR	STL.	STEEL
F.E.	FIRE EXTINGUISHER ON BRACKET	STRUCT.	STRUCTURAL
F.E.C.	FIRE EXTINGUISHER IN CABINET	S.O.G.	SLAB ON GRADE
F.D.	FLOOR DRAIN	SUSP.	SUSPENDED
F.P.C.	FIRE PROTECTION CONTRACTOR	T	TREAD
FTG.	FOOTING	T.O.F.	TOP OF FOOTING
F.V.	FIELD VERIFY	T.O.S.	TOP OF STEEL
GALV.	GALVANIZED	TYP.	TYPICAL
G.C.	GENERAL CONTRACTOR	VERT.	VERTICAL
GYP.	GYPSUM	V.T.R.	VENT THRU ROOF
H.M.	HOLLOW METAL	W/	WITH
HORIZ.	HORIZONTAL	WD.	WOOD

DRAWING INDEX AND SYMBOLS

ROOM NAME 000 — ROOM NAME & NUMBER
000 — DOOR NUMBER
X — WALL TYPE
X — ELEVATION REFERENCE
X — SECTION CUT REFERENCE
X — BUILDING SECTION REFERENCE

RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

1. SCOPE OF WORK
THE FOLLOWING IS INTENDED TO CONVEY A GENERAL DESCRIPTION OF THE WORK TO BE PERFORMED FOR THIS PROJECT:

THE CONTRACTOR'S RESPONSIBILITIES INCLUDE, BUT ARE NOT LIMITED TO, CONSTRUCTION PROCEDURES, MATERIALS, INSTALLATION SEQUENCE, AND COORDINATION WITH THE OWNER.

THE CONTRACTOR SHALL SECURE AND PAY FOR ANY AND ALL LICENSES, GOVERNMENT FEES, AND PERMITS THAT MAY BE REQUIRED TO PROPERLY EXECUTE AND COMPLETE THE WORK. COMPLY WITH ALL APPLICABLE CODES, RULES, ORDINANCES AND OTHER LEGAL REQUIREMENTS.

CONTRACTOR SHALL IMMEDIATELY LOCATE ALL REFERENCE POINTS, LAYOUT WORK, AND BE RESPONSIBLE FOR ALL MEASUREMENTS AND OTHER WORK TO BE EXECUTED UNDER THE CONTRACT. VERIFY ALL FIGURES SHOWN ON THE PLANS, VERIFY ALL DIMENSIONS OF ANY EXISTING AND NEW WORK, BE RESPONSIBLE FOR THEIR ACCURACY AND SUBMIT ANY DIFFERENCES FOUND TO THE OWNER BEFORE PROCEEDING WITH THE WORK, NO EXTRA COMPENSATION WILL BE PERMITTED BECAUSE OF DIFFERENCE BETWEEN ACTUAL DIMENSIONS AND MEASUREMENTS INDICATED ON THE DRAWINGS.

2. STANDARDS & SPECIFICATIONS
CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO ANY EXISTING ITEM AND / OR MATERIAL INSIDE OR OUTSIDE CONTRACT LIMIT / PROPERTY LINE DUE TO CONSTRUCTION. ALL WORK MUST BE IN ACCORDANCE WITH LOCAL AND / OR STATE CODES AND REGULATIONS. CONTRACTOR IS TO COMPLY WITH ODOT ITEM 107.10. WORK IS TO BE SATISFACTORY TO THE PROPERTY OWNER.

ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATIONS OF THE CITY, AND THE LATEST EDITION OF THE OHIO DEPARTMENT OF TRANSPORTATION CONSTRUCTION AND MATERIAL SPECIFICATIONS. IN THE CASE OF A CONFLICT BETWEEN CITY AND ODOT REQUIREMENTS, THE CITY REQUIREMENTS WILL TAKE PRECEDENCE, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

3. PLAN DISCREPANCIES
ANY DISCREPANCIES FROM THE PLAN INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY SO THAT APPROPRIATE ADJUSTMENTS IN ALIGNMENT AND / OR GRADE MAY BE MADE PRIOR TO THE START OF CONSTRUCTION.

FAILURE BY THE CONTRACTOR TO VERIFY AND / OR DETERMINE EXISTING INFORMATION AS INDICATED WILL RESULT IN THE CONTRACTOR BEING RESPONSIBLE FOR ANY CHANGES NECESSARY TO COMPLETE THE WORK SPECIFIED WITHOUT ADDITIONAL COMPENSATION.

4. PLAN MODIFICATION
ANY MODIFICATIONS TO THE NOTES, OR CHANGES TO THE WORK AS SHOWN ON THESE PLANS MUST HAVE PRIOR WRITTEN APPROVAL OF THE ENGINEER.

5. SAFETY
IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS, TOGETHER WITH EXERCISING PRECAUTIONS AT ALL TIMES FOR THE PROTECTION OF THE RESIDENTS (INCLUDING EMPLOYEES), WORKERS, GENERAL PUBLIC AND PROPERTY. IT IS ALSO THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK.

THE CONTRACTOR SHALL PROPERLY SUPPORT AND / OR MAINTAIN ALL EXCAVATIONS PER. APPLICABLE SAFETY REQUIREMENTS AND COMPLY WITH ALL OSHA REGULATIONS. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE OWNER OF THE PROJECT'S ASSIGNED "COMPETENT PERSON" IN OSHA EXCAVATION STANDARDS.

PUBLIC STREETS SHALL BE KEPT CLEAN AND FREE OF DEBRIS (MUD, STONE, ETC.) AT ALL TIMES.

THE CONTRACTOR SHALL ALERT ALL LOCAL EMERGENCY AGENCIES (FIRE, POLICE, AMBULANCE, ETC.) OF THE NATURE OF THE PROPOSED PROJECT PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITY. ACCESS FOR EMERGENCY VEHICLES SHALL BE MAINTAINED AT ALL TIMES.

6. BASE MAPPING
SURVEY INFORMATION HAS BEEN PROVIDED BY DEIBEL SURVEYING INC. ALL BENCHMARKS AND TOPOGRAPHY SHOULD BE FIELD VERIFIED BY THE CONTRACTOR. BENCHMARKS SHOWN ON PLAN ESTABLISHED BY OR FOUND BY DEMPSEY SURVEYING. CONDITION OF BENCHMARK MUST BE VERIFIED PRIOR TO CONSTRUCTION.

7. EXISTING UTILITIES
VIEW THE SITE AND COORDINATE WITH THE OWNER REGARDING LOCATION OF EXISTING FACILITIES AND ANY POSSIBLE UTILITY SERVICE INTERRUPTION OR RELOCATION. THE CONTRACTOR'S RESPONSIBILITIES INCLUDE, BUT ARE NOT LIMITED TO, THE INVESTIGATION, VERIFICATION OF EXISTING UTILITY DIMENSIONS AND LOCATION, SUPPORT, PROTECTION AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT.

THE CONTRACTOR SHALL NOTIFY THE OHIO UTILITY PROTECTION SERVICE (OUPS) AT 1-800-362-2764, THE CITY ENGINEER, AND ALL PRIVATE UTILITY OWNERS A MINIMUM OF 48 HOURS PRIOR TO ANY EARTH DISTURBING ACTIVITY.

ALL UTILITY INFORMATION SHOWN ON THESE PLANS IS BASED UPON THE SURVEY COMPLETED BY DEIBEL SURVEYING INC., AND RECORD DRAWINGS, AND IS PROVIDED AS A REFERENCE ONLY. IT IS BELIEVED THAT THESE LOCATIONS ARE ESSENTIALLY CORRECT. HOWEVER, THE OWNER AND ENGINEER DO NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THESE EXISTING UTILITIES. CONTRACTOR MAY DIG TEST PITS AT THEIR OWN EXPENSE.

8. EXISTING MONUMENTATION
THE CONTRACTOR SHALL PRESERVE ALL CORNERSTONES, IRON PINS, CONCRETE MONUMENTS AND / OR ANY TYPE OF LAND MONUMENT. ALL MONUMENTS IN THE PROXIMITY OF THE WORK SHALL BE REFERENCED. THE CONTRACTOR SHALL REPLACE / RESET ANY DISTURBED OR DAMAGED MONUMENTS, AND SHALL FURNISH A CERTIFICATION BY A REGISTERED SURVEYOR THAT THE MONUMENTS HAVE BEEN RESTORED TO THEIR ORIGINAL STATE.

9. DEWATERING OPERATIONS
WHEN DEEMED NECESSARY, THE CONTRACTOR MAY PLAN AND INSTALL DEWATERING EQUIPMENT PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMITS AND PLANS FOR THE INSTALLATION AND SUBSEQUENT REMOVAL OF DEWATERING EQUIPMENT AS MAY BE NECESSARY PER STATE AND LOCAL GOVERNING AGENCIES.

10. INSPECTION
ALL WORK REQUIRED FOR THIS IMPROVEMENT PLAN SHALL BE SUBJECT TO INSPECTION BY THE CITY OR THEIR DESIGNATED REPRESENTATIVE. THE CONTRACTOR SHALL GIVE A 48 HOUR NOTICE BEFORE STARTING ANY WORK ON THIS PROJECT AND SHALL KEEP THE CITY AND THE OWNER INFORMED OF HIS / HER CONSTRUCTION SCHEDULE. NO WORK SHALL BE PERFORMED AND / OR BURIED UNLESS AN AUTHORIZED INSPECTOR IS PRESENT.

11. CONSTRUCTION NOISE
CONSTRUCTION NOISE ASSOCIATED WITH ANY IMPROVEMENT PROJECT, SHALL BE LIMITED TO LEVELS COMMENSURABLE WITH ADJOINING LAND AND THEIR ASSOCIATED USAGE AS DETERMINED BY THE CITY ENGINEER, IN ORDER TO MINIMIZE ANY ADVERSE CONSTRUCTION NOISE IMPACTS, ANY POWER-OPERATED CONSTRUCTION-TYPE DEVICE SHALL NOT BE OPERATED BETWEEN THE HOURS OF 7:00 P.M. AND 8:00 A.M, UNLESS AUTHORIZED BY THE OWNER AND CITY ENGINEER.

CONSTRUCTION HOURS AND ACCEPTABLE NOISE LEVELS ARE TO BE APPROVED BY THE OWNER.

12. DUST CONTROL
THE CONTRACTOR SHALL FURNISH AND APPLY WATER AND CALCIUM CHLORIDE FOR DUST CONTROL AS DIRECTED BY THE OWNER AND / OR CITY ENGINEER. SUFFICIENT QUANTITIES OF CALCIUM CHLORIDE SHALL BE STORED ON THE JOB SITE AT ALL TIMES TO BE USED FOR DUST CONTROL.

13. MAINTENANCE OF TRAFFIC
THE CONTRACTOR IS TO MAINTAIN ACCESS ALONG REGENT AVE. N.E. AT ALL TIMES. THE CONTRACTOR MUST SUBMIT A MAINTENANCE OF TRAFFIC PLAN TO THE OWNER AND CITY (IF APPLICABLE) FOR APPROVAL PRIOR TO THE START OF CONSTRUCTION.

USE SIGNS, BARRICADES, FLAGMEN OR GUARDS AS REQUIRED DURING CONSTRUCTION ACTIVITIES TO ENSURE THE SAFETY FOR ALL VEHICULAR AND PEDESTRIAN TRAFFIC. NO UNMANNED EXCAVATION SHALL BE LEFT UNPROTECTED. ALL TEMPORARY TRAFFIC CONTROL / FLAGGING ARE TO BE IN ACCORDANCE WITH ODOT ITEM 614, AS WELL AS OHIO REVISED CODE SECTION 4571.09.

14. DIMENSION
ALL DIMENSIONS ARE TO EDGE OF PAVEMENT, FACE OF CURB, AND FACE OF BUILDING, UNLESS OTHERWISE NOTED.

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND REGULATIONS AND RELATIONS TO OTHER WORK BEFORE FABRICATION AND / OR INSTALLATION. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT OF WORK.

15. CONSTRUCTION AREA
CONFINE OPERATIONS TO AREAS BEING CONSTRUCTED OR REPAIRED. DO NOT UNREASONABLY ENCUMBER THE SITE WITH MATERIALS OR EQUIPMENT. COORDINATE ALL CONSTRUCTION ACTIVITIES WITH THE OWNER.

TAKE ALL PRECAUTIONS TO PREVENT INTERFERENCE WITH NORMAL OPERATIONS OF THE OWNER. DO NOT BLOCK OR INTERFERE WITH REQUIRED LEGAL EXITING.

THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER THAT LOCAL TRAFFIC SHALL HAVE ACCESS THROUGHOUT THE PROJECT IN A MANNER APPROVED BY THE CITY ENGINEER.

NO TRENCH OR EXCAVATION SHALL BE LEFT OPEN OVERNIGHT. OPEN AREAS ARE TO BE BACKFILLED OR STEEL PLATED. IN CASE OF INCLEMENT WEATHER OR OTHER REASONS, THE TRENCH SHALL BE BACKFILLED OR STEEL PLATED AT THE DIRECTION OF THE ENGINEER OR THE AUTHORITY HAVING JURISDICTION.NO TRENCH MAY BE BACKFILLED WITHOUT INSTALLED UTILITIES BEING REVIEWED BY ASSOCIATED INSPECTOR(S).

THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING THE SITE CLEAN AT ALL TIMES, TAKE RESPONSIBILITY FOR FINAL CLEANING, AND REMOVAL OF ALL TOOLS, EQUIPMENT AND SURPLUS MATERIALS FROM THE SITE AT COMPLETION OF THE WORK. DO NOT STOCKPILE ANY EXCESS CUT MATERIAL THAT IS NOT TO BE USED FOR ON-SITE FILL. HAUL AWAY AND PROPERLY DISPOSE OF ALL EXCESS CUT MATERIAL AT NO ADDITIONAL EXPENSE TO THE OWNER.

16. GENERAL
THE CONTRACTOR SHALL FURNISH A CERTIFICATE FROM A REGISTERED PROFESSIONAL SURVEYOR STATING THAT ALL HORIZONTAL AND VERTICAL CONTROL MONUMENTS AFFECTED BY THE PROJECT WERE REMOVED AND REPLACED TO THEIR ORIGINAL REFERENCE LOCATIONS AND ELEVATIONS.

ALL ROAD SURFACES, UTILITIES, BUILDINGS, STRUCTURES, SITE CONDITIONS, OR RIGHT-OF-WAYS DISTURBED BY CONSTRUCTION OF ANY PART OF THIS IMPROVEMENT ARE TO BE RESTORED COMPLETELY TO THE BEFORE CONSTRUCTION CONDITION. ALL ITEMS ARE INCLUDED IN THE PAY ITEMS.

ALL EXISTING SITE PAVEMENT MATERIAL REMOVED AS PART OF THIS IMPROVEMENT SHALL BE DISPOSED OF OFF SITE BY THE CONTRACTOR.

ALL DISTURBED SIGNS, GUARDRAIL, MAIL AND / OR PAPER BOXES, DRIVES AND DRIVE CULVERTS SHALL BE REPAIRED AND / OR REPLACED AS DIRECTED BY THE ENGINEER.

ALL DISTURBED AND / OR DAMAGED STORM SEWER PIPES, STORM SEWER APPURTENANCES, PAVEMENTS, BERMS AND DITCHES SHALL BE REPAIRED AND / OR REPLACED AS DIRECTED BY THE ENGINEER.

ANY DEFECTS IN CONSTRUCTION INCLUDING MATERIALS OR WORKMANSHIP SHALL BE REPLACED OR CORRECTED BY REMOVAL AND REPLACEMENT OR OTHER APPROVED METHOD PRIOR TO ACCEPTANCE BY THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.

THE CONTRACTOR SHALL REVIEW THE GEOTECHNICAL REPORT AND PERFORM SUB-GRADE PREPARATION WORK ACCORDING TO THE GEOTECHNICAL ENGINEER'S REQUIREMENTS AND FIELD DIRECTION. ACTUAL FIELD CONDITIONS MAY REQUIRE DECISIONS ON MATERIAL HANDLING AND USAGE. THE CONTRACTOR SHALL CONTINUALLY MONITOR AND MAINTAIN OVERALL SITE BALANCE AND COORDINATE ANY REVISIONS WITH THE OWNER AND ENGINEER. ANY EXCESS TOPSOIL OR ORGANIC MATERIAL MAY BE SPOILED ON-SITE IF APPROVED BY THE OWNER.

BEFORE ACCEPTANCE OF THE SUB-GRADE BY THE ENGINEER, PROOF-ROLLING SHALL BE REQUIRED ON ALL AREAS TO BE PAVED PER ODOT ITEM 204.06 CMS (LATEST EDITION). IN ADDITION, FOR ANY FILL IN EXCESS OF TWO (2) FEET, NUCLEAR COMPACTION TESTS SHALL BE PERFORMED BY AN APPROVED ODOT COMPANY AS PER ODOT ITEM 203. THESE TESTS SHALL BE APPROVED BY THE ENGINEER BEFORE ANY PAVEMENT CONSTRUCTION.

FOR ODOT ITEMS 301 - ASPHALT CONCRETE BASE, 304 - AGGREGATE BASE, 441 - ASPHALT CONCRETE, 451 - REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT, AND 452 - NON-REINFORCED PORTLAND CEMENT CONCRETE PAVEMENT, THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A JOB MIX FORMULA FOR REVIEW AND APPROVAL PRIOR TO THE PRE-CONSTRUCTION MEETING. ALL MATERIALS USED MUST BE OBTAINED FROM A SOURCE APPROVED BY ODOT.

THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS TO PERFORM THE WORK SPECIFIED IN THE CONTRACT DOCUMENTS.

EXISTING CONDITIONS NOTES

UNDERGROUND FACILITIES, UTILITIES AND STRUCTURES HAVE BEEN PLOTTED FROM FIELD OBSERVATION AND THEIR LOCATION MUST BE CONSIDERED APPROXIMATE ONLY. NEITHER KARPINSKI ENGINEERING OR DEIBEL SURVEYING INC. NOR ANY OF THEIR EMPLOYEES TAKE RESPONSIBILITY FOR THE LOCATION OF ANY UNDERGROUND STRUCTURES AND/OR UTILITIES NOT SHOWN THAT MAY EXIST. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND STRUCTURES AND/OR UTILITIES LOCATED PRIOR TO EXCAVATION BY CALLING 811,

CIVIL SYMBOL LEGEND

DESCRIPTION	EXISTING	PROPOSED
BUILDING		
SIGN		
CURB STOP		
TREE OR BUSH		
PIPE BOLLARD		
GAS TEST NODE		
MONITORING WELL		
GUY WIRE		
GAS VALVE		
UTILITY POLE		
HEADWALL / ENDWALL		
SANITARY & STORM MANHOLE		
CATCH BASIN / CURB INLET		
CLEANOUT		
DOWNSPOUT DRAIN		
ELECTRIC METER		
WATER VALVE		
FIRE HYDRANT		
FINISHED FLOOR		
ELECTRIC JUNCTION BOX		
LAMP POST		
RECEPTACLE		
GAS WELL		
FLOW LINE		

CIVIL LINE TYPE LEGEND

DESCRIPTION	EXISTING	PROPOSED
APPROXIMATE LIMIT OF CONST.	LOCN	LOCN
CABLE TELEVISION (UG)	CATV	CATV
COMBINATION SEWER LINE	COMB	COMB
COMMUNICATION LINE (UG)	COMM	COMM
CONTOUR (MAJOR)	XXX	XXX
CONTOUR (MINOR)	XXX	XXX
FENCE	X	X
FILTER SOCK	FS	FS
FIRE LINE	F	F
FORCE MAIN	FM	FM
GAS LINE	G	G
IRRIGATION	IRRG	IRRG
ORANGE CONSTRUCTION FENCE	OCF	OCF
POWER LINE (OVH)	OH	OH
POWER LINE (UG)	E	E
PROPERTY LINE	PL	PL
RIGHT-OF-WAY LINE	R/W	R / W
WATER LINE	W	W
SILT FENCE	SF	SF
STEAM LINE	STEAM	STEAM
STORM LINE	ST	ST
SANITARY LINE	SAN	SAN

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED PROFESSIONAL ENGINEER
2-24-2022

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
GENERAL NOTES SHEET

COMM 17186
DATE 02-24-2022

DWG
C-0

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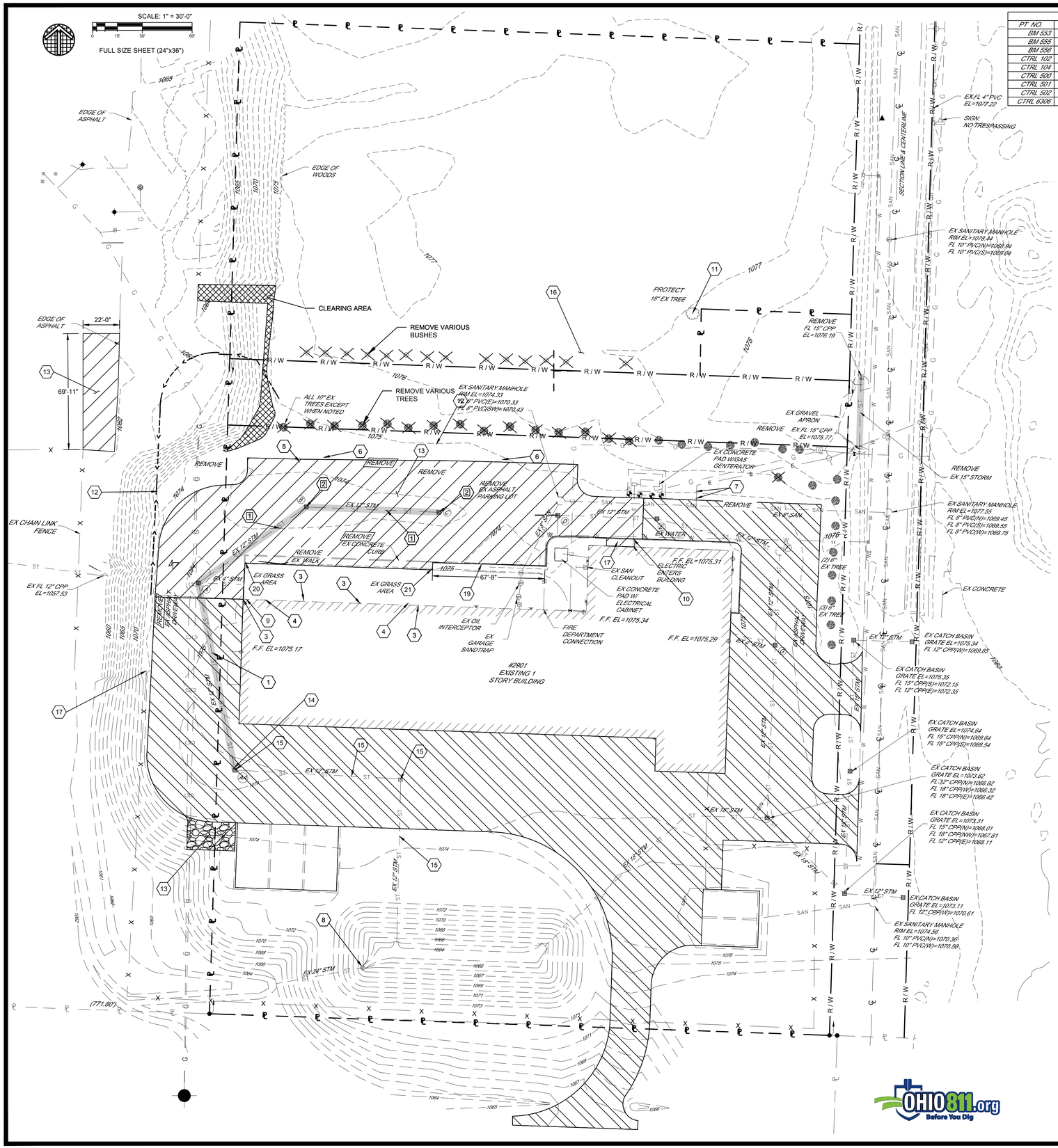

BENCHMARK AND CONTROL POINTS				
PT NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
BM 553	425359.13	2289859.59	1074.95	"X" IN THE N.W. CORNER OF A CONCRETE SLAB
BM 555	425607.41	2290256.55	1078.42	"X" IN THE WEST RIM OF A SANITARY MANHOLE
BM 556	425442.86	2290255.88	1077.56	"X" IN THE WEST RIM OF A SANITARY MANHOLE
CTRL 102	425230.59	2290269.78	-	5/8" ROD W/CONERY CAP FOUND ALONG REGENT AVE.
CTRL 104	425738.47	2289886.70	-	HEX HEAD MONUMENT FOUND
CTRL 500	425209.68	2290259.57	1074.72	PK NAIL SET IN ASPHALT ALONG REGENT AVE.
CTRL 501	425680.38	2290253.41	1078.35	PK NAIL SET IN ASPHALT ALONG REGENT AVE.
CTRL 502	425619.51	2289916.97	1076.83	10" PK NAIL SET IN ASPHALT OF PARKING LOT
CTRL 6306	425625.73	2290281.75	-	5/8" ROD FOUND ALONG REGENT AVE.

LEGEND

- FULL DEPTH PAVEMENT AND SIDEWALK REMOVAL
- CLEARING AREA
- MILL AND REPAVE AREA
- TREE/BRUSH REMOVAL
- PIPE REMOVAL

EXISTING STORM SANITARY STRUCTURES

(AA) CATCH BASIN
GRATE EL=1073.61
FL 12" CPP(N)=1066.66
FL 15" CPP(E)=1066.41

(A) CATCH BASIN
GRATE EL=1073.86
FL 12" CPP(NE)=1068.66
FL 12" CPP(S)=1068.51
FL 4" PVC(E)=1069.06

(B) CATCH BASIN
GRATE EL=1073.39
FL 12" CPP(E)=1069.69
FL 12" CPP(SW)=1069.59

(C) CATCH BASIN
GRATE EL=1073.81
FL 12" CPP(W)=1070.31

(D) CATCH BASIN
GRATE EL=1074.08
FL 12" CPP(E)=1070.58
FL 4" PVC(S)=1071.08

(E) CATCH BASIN
GRATE EL=1074.41
FL 12" CPP(W)=1070.21
FL 12" CPP(SE)=1070.11

(F) STORM MANHOLE
RIM EL=1074.49
FL 12" CPP(NW)=1069.89
FL 12" CPP(S)=1069.49

(G) CATCH BASIN
GRATE EL=1074.47
FL 12" CPP(N)=1068.87
FL 12" CPP(S)=1068.77
FL 4" PVC(W)=1069.47

PLAN NOTES

1. REMOVE STORM PIPE
2. REMOVE STORM STRUCTURE
3. REMOVE DOWNSPOUT
4. REMOVE RECEPTACLE
5. REMOVE WHEELSTOPS
6. REMOVE LIGHT POLE, INCLUDING CONCRETE FOUNDATION
7. REMOVE GATE AND GATE CONTROLLER
8. REMOVE AND REPLACE EXISTING REDUCER CAP INSIDE EXISTING OUTLET STRUCTURE. NEW 1.7-INCH ORIFICE SHALL BE DRILLED AT INVERT ELEVATION 1064.00.
9. BEGIN CURB REMOVAL
10. END CURB REMOVAL
11. PROTECT EXISTING TREE. SEE DEMOLITION NOTE 6 BELOW
12. REMOVE EXISTING FENCE
13. REMOVE EXISTING PAVEMENT
14. PLUG WITH BRICK AND MORTAR 12" PIPE TO EAST
15. TO REMAIN IN PLACE
16. TEMPORARY CONSTRUCTION PARKING AREA (SEE SWPPP PLAN ON SHEET C-5)
17. SIDEWALK REMOVAL AREA
18. FENCE REMOVAL LIMITS
19. SAW-CUT AND REMOVE CURB, SIDEWALK TO REMAIN
20. BEGIN WALK REMOVAL
21. END WALK REMOVAL

DATUM & BASIS OF BEARINGS

THE STARK COUNTY GEODETIC REFERENCE SYSTEM POINTS USED AS REFERENCE STATIONS TO ESTABLISH THE DATUM ARE DESIGNATED AS PLA35-03 & PLA35-02.

ALL BEARINGS SHOWN ARE BASED ON GRID NORTH. ALL DIMENSIONS SHOWN ARE GROUND DISTANCES. TO OBTAIN A GRID DISTANCE, MULTIPLY THE GROUND DISTANCE BY THE PROJECT COMBINED FACTOR (PCF) OF 0.99989433.

THE STARK COUNTY GEODETIC REFERENCE SYSTEM IS BASED ON OHIO STATE PLANE COORDINATES, NORTH ZONE, NAD83 HORIZONTAL (1986 ADJUSTMENT).

SOURCES USED:

1. TAX MAP- CANTON 008C
2. DEEDS (AS SHOWN)
3. SURVEYS:- BRUCE D. CONERY - DATED 12/18/2007
4. STARK COUNTY GIS DATA
5. PLAT:- STEPHEN'S HOMESITES
   PLAT BOOK 20, PAGE 63
   LOTS 1-39

GENERAL NOTES

1. UTILITIES: THE CONTRACTOR SHALL GIVE DUE NOTICE TO THE OWNERS OF ALL UTILITIES AND SHALL SEE THAT THEIR PROPERTY IS PROPERLY SUPPORTED AND PROTECTED BEFORE DISTURBING, UNDERMINING, OR INTERFERING WITH THE SAME. AND IN NO CASE SHALL THE SERVICE OF ANY SUCH UTILITY BE DISRUPTED OR INTERFERED WITH, WITHOUT WRITTEN CONSENT OF THE OWNER THEREOF, AND IN CASE OF SEWER, PIPE, CONDUIT, POLE OR OTHER PUBLIC UTILITY PROPERTY IS DAMAGED OR MUST BE MOVED OR SUPPORTED, THE REPAIR, REMOVAL OR SUPPORTING SHALL BE DONE BY THE OWNER AND THE DESIGN BUILDER SHALL PAY ALL NECESSARY EXPENSE IN CONNECTION THEREWITH.
2. DAMAGES TO THE ADJACENT PROPERTY OR STRUCTURES MUST BE CAREFULLY GUARDED AGAINST,ESPECIALLY IN MAKING EXCAVATIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES TO THE FULL EXTENT, IF THE SAME ARE OCCASIONED THROUGH NEGLECT OR FAILURE ON THEIR PART, OR THAT OF ANYONE IN THEIR EMPLOY, TO TAKE ALL NECESSARY OR PROPER PRECAUTIONS TO PREVENT THE SAME, AND THEY SHALL ASSUME ALL RISK OF DAMAGE TO ANY PORTION OF THEIR WORK.
3. ALL EXISTING STRUCTURES INCLUDING PAVEMENT AS CALLED FOR TO BE REMOVED SHALL BE DISPOSED OF OFF-SITE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL GUIDELINES. ANY BURNING ON-SITE IS PROHIBITED.

EXISTING CONDITIONS NOTES

1. UNDERGROUND FACILITIES, UTILITIES AND STRUCTURES HAVE BEEN PLOTTED FROM FIELD OBSERVATION AND THEIR LOCATION MUST BE CONSIDERED APPROXIMATE ONLY. NEITHER KARPINSKI ENGINEERING, DEIBEL SURVEYING INC NOR ANY OF THEIR EMPLOYEES TAKE RESPONSIBILITY FOR THE LOCATION OF ANY UNDERGROUND STRUCTURES AND/OR UTILITIES NOT SHOWN THAT MAY EXIST. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND STRUCTURES AND/OR UTILITIES LOCATED PRIOR TO EXCAVATION BY CALLING 811.
2. ALL BENCHMARKS AND TOPOGRAPHY SHOULD BE FIELD VERIFIED BY THE CONTRACTOR. BENCHMARKS AND CONTROL POINTS SHOWN ON PLAN ESTABLISHED BY OR FOUND BY DEIBEL SURVEYING INC. CONDITION OF BENCHMARK MUST BE VERIFIED PRIOR TO CONSTRUCTION.

DEMOLITION NOTES

1. THIS PLAN IS INTENDED TO PROVIDE MINIMUM GUIDELINES FOR SITE DEMOLITION. IT SHOULD BE NOTED THAT ALL MANMADE FEATURES, PAVEMENT, SIGNS, POLES, CURBING, CONCRETE WALKS, UTILITIES, ETC. SHALL BE REMOVED AS NECESSARY TO CONSTRUCT WORK, UNLESS OTHERWISE NOTED TO REMAIN. THROUGHOUT THE CONSTRUCTION PROCESS, THE CONTRACTOR SHALL INFORM THE ENGINEER IMMEDIATELY OF ANY FIELD DISCREPANCIES FROM DATA AS SHOWN ON DESIGN PLANS. THIS INCLUDES ANY UNFORESEEN CONDITIONS, SUBSURFACE OR OTHERWISE FOR EVALUATION AND RECOMMENDATIONS. ANY CONTRADICTION BETWEEN ITEMS OF THIS PLAN/PLAN SET, OR BETWEEN THE PLANS AND ON-SITE CONDITIONS MUST BE RESOLVED BEFORE RELATED CONSTRUCTION HAS BEEN INITIATED.
2. ALL EXISTING STRUCTURES WITHIN THE CONSTRUCTION AREA NOTED TO REMOVE, SHALL BE REMOVED AND DISPOSED OF OFF-SITE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL GUIDELINES.
3. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND ANY EARTH MOVING OPERATIONS. SILT FENCE SHALL BE INSTALLED AT THE LIMITS OF IMPACT AREAS ACCORDING TO THE DETAILS SHOWN ON SHEET ES 2-3
4. CONTRACTOR RESPONSIBLE FOR REPAIRS AND RESTORATION OF AREAS DISTURBED BY UTILITY SERVICE INSTALLATION.
5. ALL REMOVED CAST IRON FRAME AND GRATES TO BE SALVAGED BY THE CITY OF CANTON AND LEFT WITH OWNER.
6. ONLY CUT TREES WHEN BATS ARE HIBERNATING OR CONCENTRATED NEAR THEIR HIBERNACULA. FOR PROJECT AREAS AFFECTING INDIANA BAT SWARMING HABITAT (NEAR HIBERNACULA), ONLY CUT TREES BETWEEN NOVEMBER 15 AND MARCH 31. FOR PROJECT AREAS AFFECTING INDIANA BAT SUMMER HABITAT, ONLY CUT TREES BETWEEN OCTOBER 15 AND MARCH 31.

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MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
EXISTING AND DEMOLITION PLAN

COMM 17186
DATE 02-24-2022

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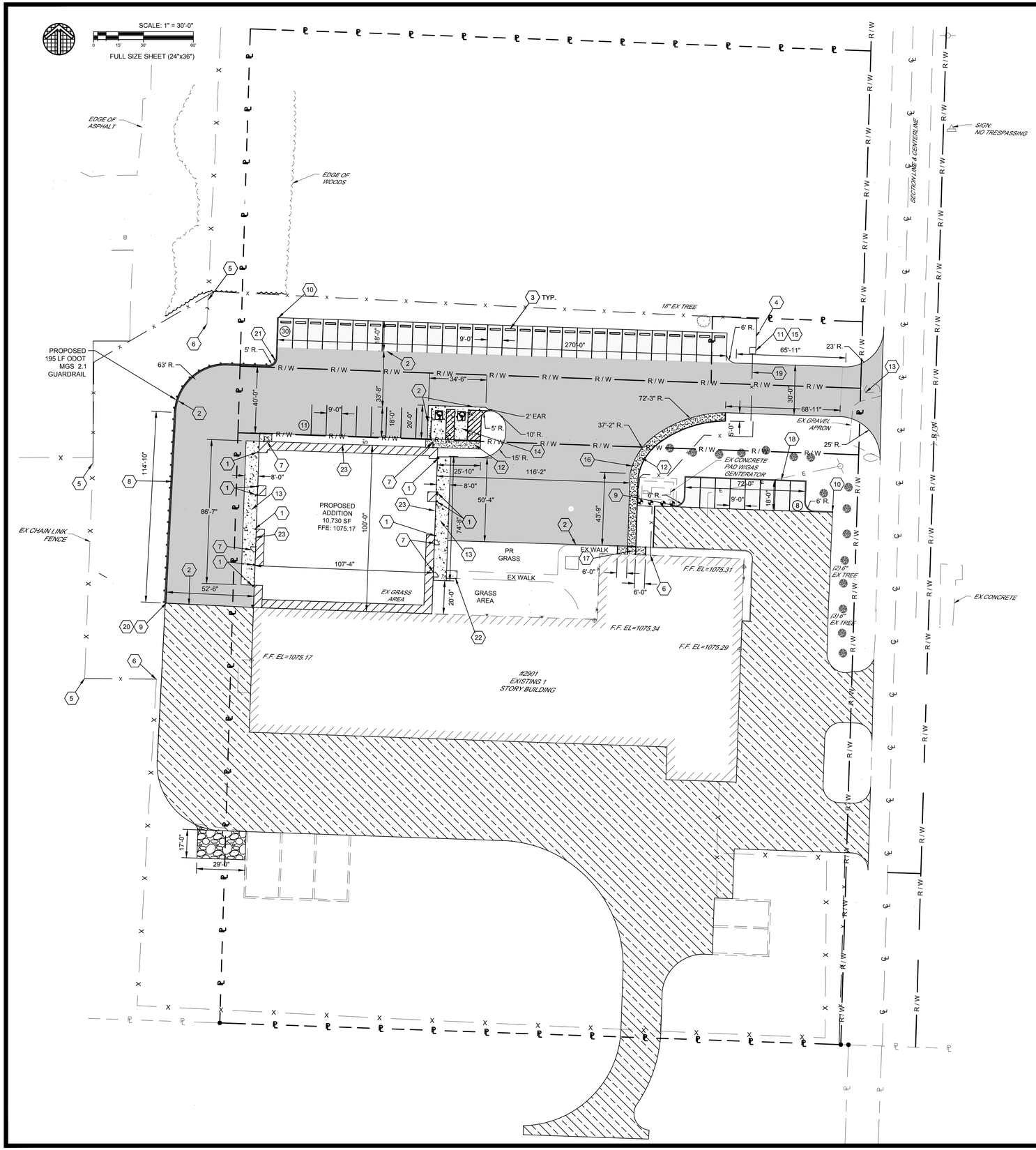

LEGEND

- STANDARD DUTY ASPHALT PAVEMENT IN PARKING STALLS
- HEAVY DUTY ASPHALT PAVEMENT IN ACCESS AISLES
- 6" CONCRETE SIDEWALK
- ASPHALT CONCRETE PLANING AND RESURFACING
- ODOT ITEM 451 8" REINFORCED CONCRETE PAVEMENT
- ODOT ITEM 452 6" NON REINFORCED CONCRETE PAVEMENT, CLASS QC IN ADA ACCESSIBLE SPACES
- 8" ODOT 304 AGGREGATE PAVEMENT
- (#) NUMBER OF PARKING SPACES
- —— x —— CHAIN LINK FENCE

(X) PLAN NOTES

1. INSTALL BOLLARDS (TYP.)
2. SEAL ALL JOINTS WHERE ASPHALT ABUTS CONCRETE, CURBS AND EXISTING ASPHALT PAVEMENT.
3. INSTALL WHEEL STOPS (TYP.)
4. PROPOSED GATE
5. BEGIN NEW CHAIN LINK FENCE
6. END NEW CHAIN LINK FENCE
7. INSTALL FROST STOOP AT WALK AT ALL DOORS (SEE STRUCTURAL PLANS)
8. 6" CONCRETE CURB, 6" REVEAL ON BOTH SIDES AND CURB DRAIN
9. BEGIN CURB
10. END CURB
11. PROPOSED ELECTRIC GATE OPERATOR (SEE ELECTRICAL PLANS)
12. PROPOSED CONCRETE SIDEWALK, PER DETAIL ON SHEET C-6
13. ODOT ITEM 451 8" REINFORCED CONCRETE PAVEMENT
14. ODOT ITEM 452 6" NON REINFORCED CONCRETE PAVEMENT, CLASS QC IN ADA ACCESSIBLE SPACES
15. REMOVE AND REPLACE WITH DOLPHIN OPERATOR (SEE ARCH PLAN FOR SPEC/MODEL)
16. SIDEWALK IS FLUSH WITH ASPHALT
17. REMOVE AND REPLACE EXISTING CURB AND SIDEWALK. INSTALL ADA CURB RAMP
18. 6" CONCRETE CURB
19. NEW GATE
20. BEGIN GUARDRAIL
21. END GUARDRAIL
22. SIDEWALK FOR GRADE TRANSITION
23. INSTALL EXPANSION JOINT BETWEEN CONCRETE PAVEMENT AND BUILDING

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED PROFESSIONAL ENGINEER
2-24-2022

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
SITE LAYOUT PLAN

COMM 17186
DATE 02-24-2022

DWG
C-2

Karpinski ENGINEERING
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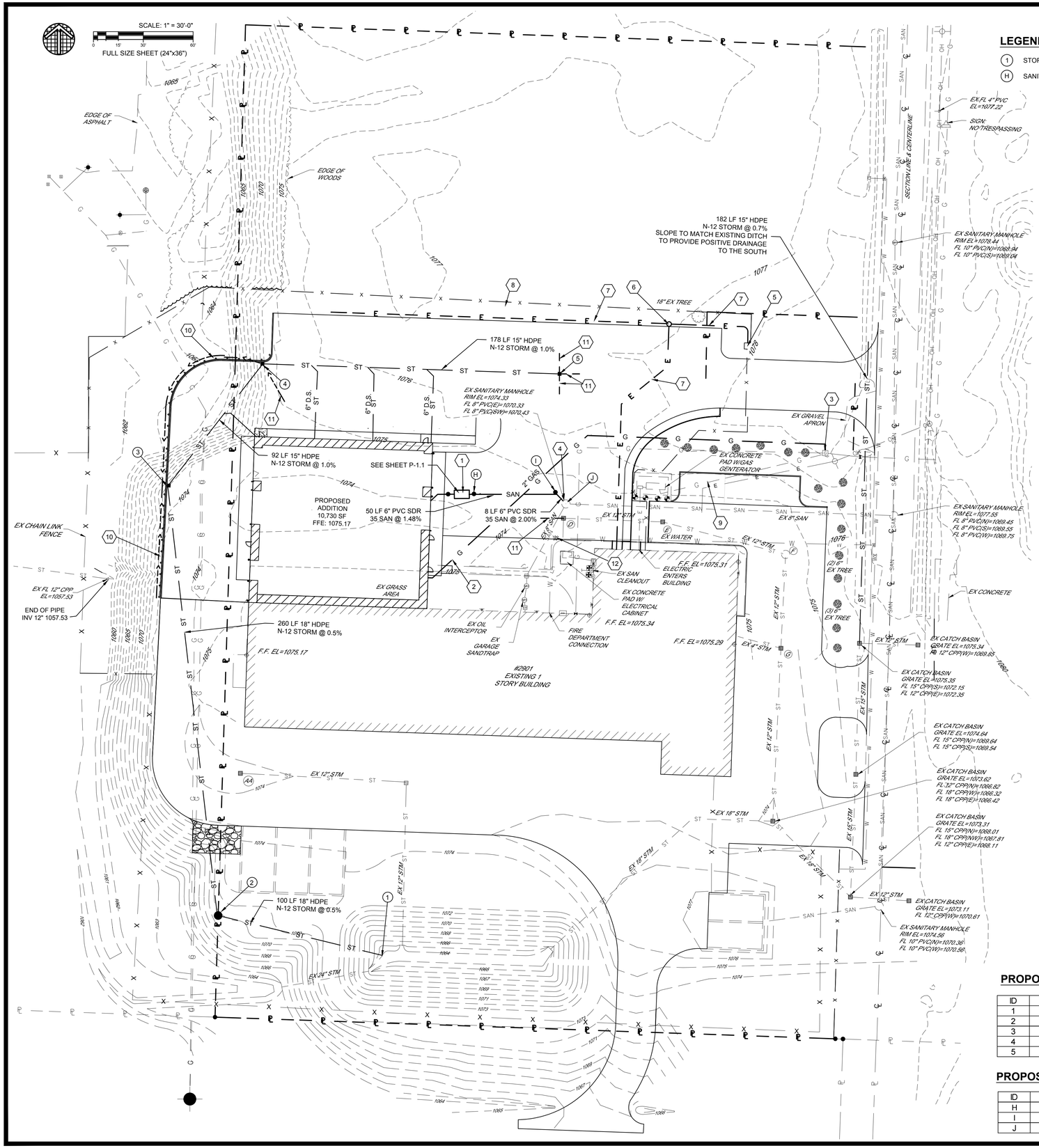

LEGEND

- (1) STORM STRUCTURE I.D.
- (H) SANITARY STRUCTURE ID

(X) PLAN NOTES

1. PROPOSED OIL INTERCEPTOR (SEE PLUMBING DETAIL)
2. PROPOSED 2" GAS LINE. REFER TO SPECS FOR PIPE MATERIAL.
3. CONNECT PROPOSED 2" GAS TO EXISTING METER
4. CORE DRILL OPENIGN IN MANHOLE, DIAMTER TO FIT BOOT SIZE. PROVIDE KOR-N-SEAL WATERTIGHT FLEXIBLE RUBBER BOOT.
5. PROPOSED ELECTRIC GATE OPERATOR (SEE ELECTRICAL PLANS)
6. PROPOSED ELECTRICAL HANDHOLE (SEE ELECTRICAL PLANS)
7. SEE SITE ELECTRICAL PLANS
8. PROPOSED FENCE
9. POTHOLE EXISTING GAS CONNECTION UNDER NEW PARKING SPACES AND REPORT TOP OF CONDUIT ELEVATION TO ENGINEER.

   AS PART OF ALTERNATE # 1 PROVIDE A PRICE TO LOWER EXISTING GAS MAIN TO PROVIDE 3'-0" OF COVER.
10. CURB DRAIN
11. 6" UNDERDRAIN
12. ADJUST WATER VALVES TO GRADE

UTILITY NOTES

1. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER, ARCHITECT AND/OR OWNER, IN ORDER TO OBTAIN AND/OR PAY ALL THE NECESSARY LOCAL PERMITS, FEES AND BONDS. REQUIRED PERMITS FOR ALL APPROVED WORK IN THE PUBLIC RIGHT-OF-WAY SHALL BE OBTAINED, BEFORE WORK BEGINS, FROM THE CITY OF CANTON. NOTIFY THE CITY PRIOR TO BEGINNING ANY WORK IN THE PUBLIC RIGHT OF WAY.
2. THE CONTRACTOR SHALL PROVIDE A MINIMUM NOTICE OF FOURTEEN (14) DAYS TO ALL CORPORATIONS, COMPANIES AND/OR LOCAL AUTHORITIES OWNING OR HAVING JURISDICTION OVER UTILITIES RUNNING TO, THROUGH OR ACROSS PROJECT AREAS PRIOR TO DEMOLITION AND/OR CONSTRUCTION ACTIVITIES.
3. THE LOCATION, SIZE, DEPTH AND SPECIFICATIONS FOR CONSTRUCTION OF PROPOSED PRIVATE UTILITY SERVICES SHALL BE TO THE STANDARDS AND REQUIREMENTS OF THE RESPECTIVE UTILITY COMPANY (ELECTRIC, GAS, AND SEWER).
4. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE OWNER, ENGINEER, ARCHITECT, CONTRACTOR, LOCAL OFFICIALS, AND ALL PROJECT-RELATED UTILITY COMPANIES (PUBLIC AND PRIVATE) PRIOR TO START OF CONSTRUCTION.
5. ALL CONSTRUCTION SHALL CONFORM TO THE CITY STANDARDS AND REGULATIONS, UNLESS OTHERWISE SPECIFIED. ALL CONSTRUCTION ACTIVITIES SHALL CONFORM TO LABOR OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) RULES AND REGULATIONS.
6. THE CONTRACTOR IS TO VERIFY LOCATION AND DEPTH OF ALL EXISTING UTILITY STUBS PRIOR TO CONSTRUCTION AND DISCONNECT ALL EXISTING SERVICE CONNECTIONS AT THEIR RESPECTIVE MAINS IN ACCORDANCE WITH THE RESPECTIVE UTILITY COMPANY'S STANDARDS AND SPECIFICATIONS.
7. AS-BUILT PLANS SHALL BE SUBMITTED TO THE DEPARTMENT OF PUBLIC WORKS.
8. THE CONTRACTOR IS RESPONSIBLE FOR PAYMENT OF ALL UTILITY CONNECTION AND ABANDONMENT FEES.
9. FRAMES AND COVERS: MANHOLE FRAMES AND COVERS SHALL BE OF HEAVY DUTY DESIGN AND PROVIDE A 24 INCH DIA., CLEAR OPENING. THE WORD "SEWER" OR "STORM" SHALL BE CAST INTO THE CENTER OF THE UPPER FACE OF EACH COVER WITH RAISED, 3" LETTERS.
10. CONTRACTOR SHALL PLACE 4" WIDE METAL WIRE IMPREGNATED RED PLASTIC WARNING TAPE OVER ENTIRE LENGTH OF ALL GRAVITY SEWERS AND SERVICES.
11. SANITARY SEWER LINES SHALL BE LOCATED AT LEAST TEN (10) FEET HORIZONTALLY FROM AN EXISTING OR PROPOSED WATER LINE. WHEN A SEWER LINE CROSSES A WATER LINE, THE SEWER LINE SHALL EXTEND A MINIMUM OF TEN (10) FEET TO EACH SIDE OF THE WATER LINE. THE SEWER LINE SHALL ALSO MAINTAIN A VERTICAL SEPARATION OF NOT LESS THAN 18 INCHES.
12. PROPOSED RIM ELEVATIONS OF STORM AND SANITARY MANHOLES ARE APPROXIMATE. FINAL ELEVATIONS AREA TO BE SET FLUSH WITH FINISHED GRADE. ADJUST ALL OTHER RIM ELEVATIONS OF MANHOLES, WATER GATES, GAS GATES AND OTHER UTILITIES TO FINISHED GRADE AS SHOWN ON THE GRADING AND THE UTILITY PLAN.
13. SEWER LINES AND ALL APPURTENANCES SHALL BE CONSTRUCTED AND TESTED IN ACCORDANCE WITH THE STATE AND STARK COUNTY SEWER AND WATER SPECIFICATIONS AND DETAILS. SANITARY SEWER SERVICE FOR THIS DEVELOPMENT IS AVAILABLE SUBJECT TO THE RULES AND REGULATIONS OF THE DEPARTMENT OF PUBLIC UTILITIES. A SINGLE SANITARY SEWER TAP FROM THIS SITE SHALL BE ALLOWED INTO THE PUBLIC SANITARY SEWER SYSTEM. DEVELOPER SHALL USE EXISTING SANITARY TAP, WHEN AVAILABLE.
14. THE CONTRACTOR SHALL HAVE THE APPROVAL OF ALL GOVERNING AGENCIES HAVING JURISDICTION OVER FIRE PROTECTION SYSTEM PRIOR TO INSTALLATION. FIRE PREVENTION NOTES APPROVED PREMISES IDENTIFICATION IS REQUIRED.
15. THE CONTRACTOR IS TO VERIFY WITH THE ARCHITECT'S PLAN THE LOCATIONS OF ALL UTILITIES STUB LOCATION WITHIN THE BUILDING PRIOR TO CONSTRUCTION.

PERMIT NOTE

CONTRACTOR SHALL OBTAIN SEWER LATERAL PERMIT FROM THE STARK COUNTY SANITARY ENGINEERING DEPARTMENT

EXISTING STORM STRUCTURES

(AA) CATCH BASIN
GRATE EL=1073.61
FL 12" CPP(N)=1066.66
FL 15" CPP(E)=1066.41

(A) CATCH BASIN
GRATE EL=1073.86
FL 12" CPP(NE)=1068.66
FL 12" CPP(S)=1068.51
FL 4" PVC(E)=1069.06

(B) CATCH BASIN
GRATE EL=1073.39
FL 12" CPP(E)=1069.69
FL 12" CPP(SW)=1069.59

(C) CATCH BASIN
GRATE EL=1073.81
FL 12" CPP(W)=1070.31

(D) CATCH BASIN
GRATE EL=1074.08
FL 12" CPP(E)=1070.58
FL 4" PVC(S)=1071.08

(E) CATCH BASIN
GRATE EL=1074.41
FL 12" CPP(W)=1070.21
FL 12" CPP(SE)=1070.11

(F) STORM MANHOLE
RIM EL=1074.49
FL 12" CPP(NW)=1069.89
FL 12" CPP(S)=1069.49

(G) CATCH BASIN
GRATE EL=1074.47
FL 12" CPP(N)=1069.87
FL 12" CPP(S)=1068.77
FL 4" PVC(W)=1069.47

PIPE MATERIAL NOTES

1. NATURAL GAS SERVICE SEE PLUMBING SPECIFICATIONS.
2. STORM SEWER: HDPE, N-12 PIPE (ALL SITE STORM)
3. UNDERDRAIN - 6" PERF. PVC SDR 35
4. SANITARY - 6" PVC SDR 35
5. ELECTRIC - PVC CONDUITS ENCASE IN MINIMUM 3" OF 4,000 PSI CONCRETE
6. DRIVEWAY CULVERT - 15" RCP CLASS IV
7. DOWNSPOUT LATERALS - 6" HDPE, N-12 PIPE

PROPOSED STORM STRUCTURES

ID	TYPE	RIM	INVERT	INVERT
1	ENDWALL HW-4	NA	18" NW=1065.00	
2	MANHOLE	1071.00	18" E=1065.50	18" N=1065.50
3	CATCH BASIN	1073.67	15" NE =1066.80	18" S=1066.80
4	CATCH BASIN	1073.75	15" E & SW=1067.72	15" E & SW=1067.72
5	CATCH BASIN	1073.50	15" W=1069.50	15" W=1069.50

PROPOSED SANITARY STRUCTURES

ID	TYPE	RIM	INVERT
H	CLEANOUT	1074.83	6" E & W=1071.42
I	CLEANOUT	1074.50	6" SE & W=1070.68
J	EX MANHOLE	EX 1074.33	PR 6" NW=1070.50

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2-24-2022

MOTTER & MEADOWS ARCHITECTS

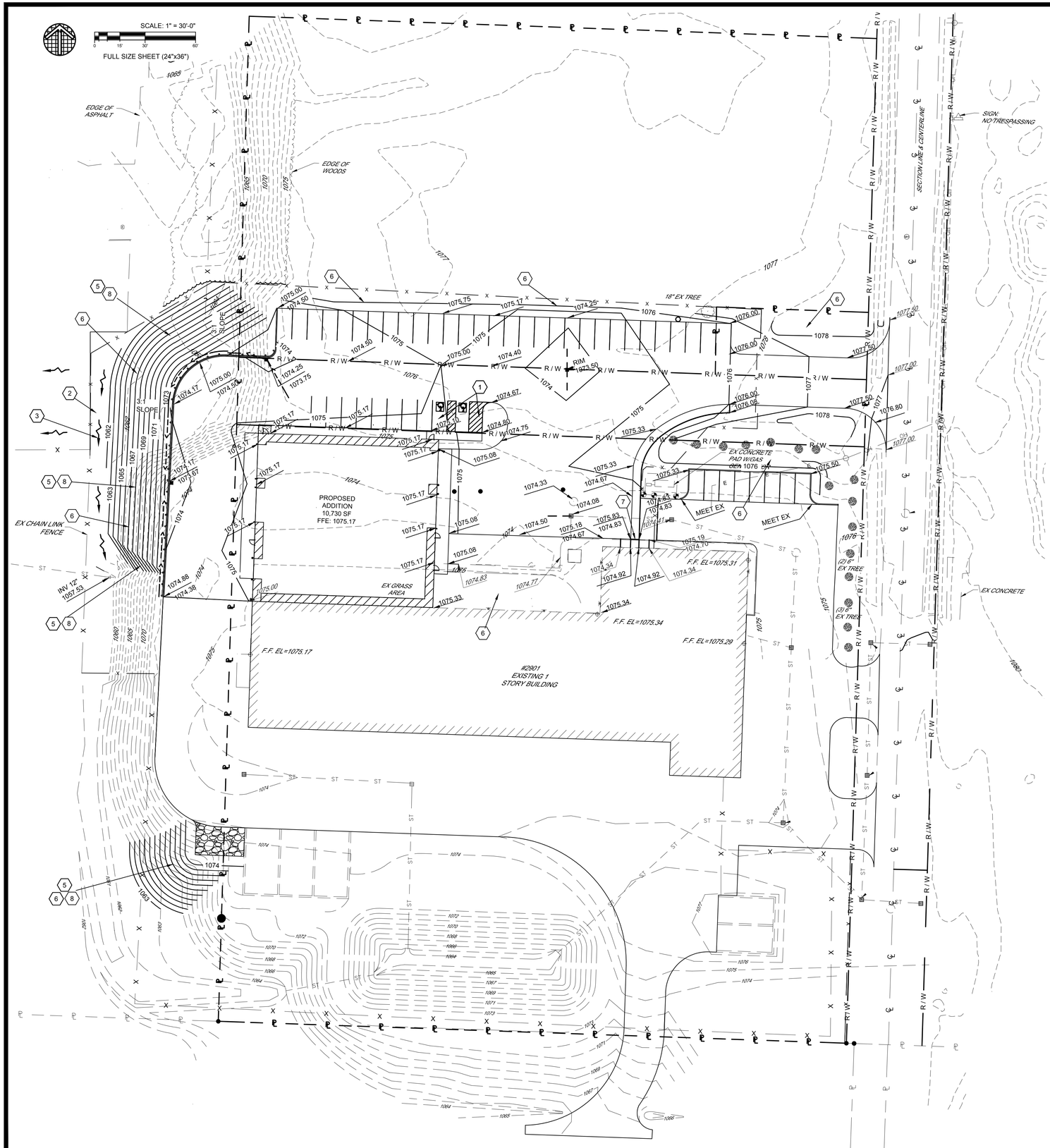
600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG : UTILITY PLAN

COMM 17186
DATE 02-24-2022

DWG C-3



LEGEND

609.00 / 608.50	PROPOSED TOP OF CURB ELEVATION / PROPOSED BOTTOM OF CURB ELEVATION
609.00	PROPOSED SPOT ELEVATION
608.50 / 608.00	EXISTING TOP OF CURB ELEVATION / EXISTING BOTTOM OF CURB ELEVATION
607.50	EXISTING ELEVATION
	FLOW ARROW

X PLAN NOTES

1. CROSS SLOPE ON ADA ACCESSIBLE SPACE CONCRETE PAD SHALL NOT EXCEED 2.00% IN ANY DIRECTION.
2. CONTRACTOR SHALL REMOVE PAVEMENT IN ADJACENT PARKING LOT AS NECESSARY TO CONSTRUCT EMBANKMENT 3:1 FILL, GRADE BOTTOM EMBANKMENT TO DRAIN TO EDGE OF ASPHALT
3. CONSTRUCT SWALE ALONG BOTTOM OF EMBANKMENT TO DRAIN TO THE EXSTING 12" CULVERT
4. CONTACT GEOTECHNICAL TESTING AGENCY TO OBSERVE FINAL EMBANKMENT GRADING FOR NEW BUILDING FOUNDATION AND PAD
5. THE CONTARCTOR SHALL INSTALL ALL EMBANKMENTS PER ODOT GB2: SPECIAL BENCHING AND SIDEHILL EMBANKMENT FILLS DOCUMENT AND GEOTECHNICAL ENGINEER RECOMENDATIONS;

   DOCUMENT CAN BE OBTAINED FROM THE FOLLOWING WEBSITE: HTTP://WWW.DOT.STATE.OH.US/DIVISIONS/ENGIENERING/GEOTECHNICAL. SHALL NEW FILL BE BENCHED INTO THE EXISTING HILLSIDE.
6. PROVIDE 4" TOPSOIL, SEED, FERTILIZER, PRAIRIE SEED MIX, STRAW MAT TO ALL DISTURBED AREAS
7. 0" CURB REVEAL AND PROPOSED ADA RAMP
8. INSTALL HIGH PERFORMANCE TURF REINFORCEMENT MAT ALONG NEW EMBANKMENT ON WEST SIDE OF SITE

GENERAL NOTES

1. UNDERGROUND FACILITIES, UTILITIES AND STRUCTURES HAVE BEEN PLOTTED FROM FIELD OBSERVATION AND THEIR LOCATION MUST BE CONSIDERED APPROXIMATE ONLY. NEITHER DEIBEL SURVEYING INC. NOR ANY OF THEIR EMPLOYEES TAKE RESPONSIBILITY FOR THE LOCATION OF ANY UNDERGROUND STRUCTURES AND/OR UTILITIES NOT SHOWN THAT MAY EXIST. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND STRUCTURES AND/OR UTILITIES LOCATED PRIOR TO EXCAVATION BY CALLING 811.
2. ELEVATIONS SHOWN ARE TIED TO TO THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)
3. ALL BENCHMARKS AND TOPOGRAPHY SHOULD BE FIELD VERIFIED BY THE CONTRACTOR. BENCHMARKS SHOWN ON PLAN ESTABLISHED BY OR FOUND BY DEIBEL SURVEYING INC. CONDITION OF BENCHMARK MUST BE VERIFIED PRIOR TO CONSTRUCTION.
4. SITE GRADING SHALL NOT PROCEED UNTIL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED PROFESSIONAL ENGINEERS
2-24-2022

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
GRADING PLAN

COMM 17186
DATE 02-24-2022

DWG
C-4

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
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SCALE: 1" = 30'-0"

0 15' 30' 60'

FULL SIZE SHEET (24"x36")

I, THE UNDERSIGNED, CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGED THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

Chris Bednar 2/24/2022

PLAN NOTES

(1) CONTRACTOR SHALL INSTALL THE 304 BASE FOR THE PROPOSED PAVEMENT TO BE USED AS TEMPORARY PARKING DURING CONSTRUCTION. INSTALL 304 AGGREGATE BASE TO THE PLAN GRADES ON A COMPACTED SUBGRADE. PRIOR TO THE INSTALLATION OF THE FINAL ASPHALT SURFACE THE CONTRACTOR SHALL RECOMPACT THE AGGREGATE BASE AND REMOVE ANY RUTTING THAT HAVE OCCURRED AS A RESULT OF BEING USED AS A TEMPORARY PARKING AREA.

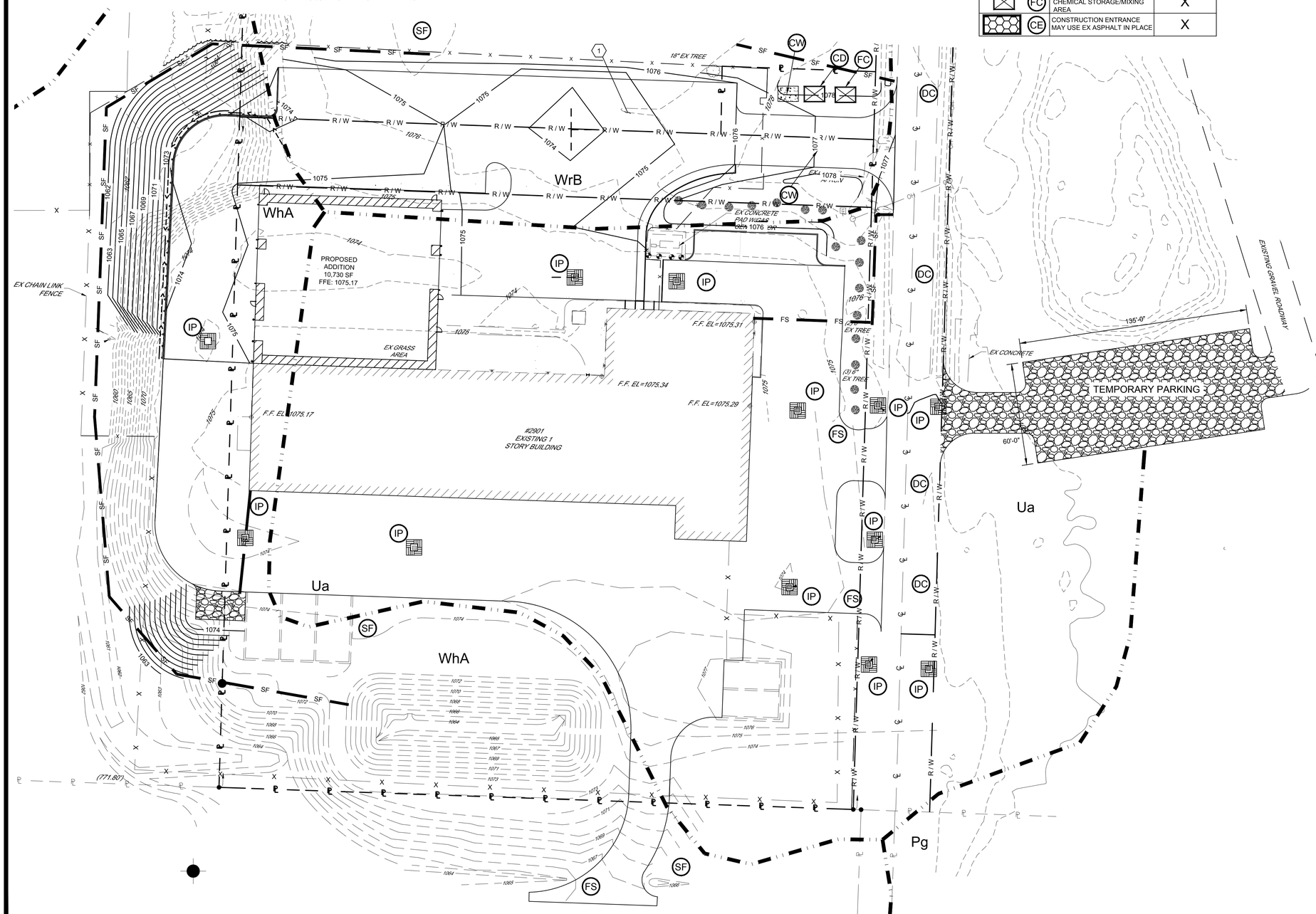
SOIL NAMES AND HSG GROUPS:

SOIL TYPE	NAME	HYDROLOGIC SOIL GROUP PRE CONSTRUCTION	HYDROLOGIC SOIL GROUP POST-CON.
WrB	WHEELING SILT LOAM	B	C
WhA	WEINBACH SILT LOAM	D	D
Ua	UDORTHENTS	C	C

BnB — SOIL TYPE

SOIL BOUNDARY LINE

SWPPP LEGEND		BMPs UTILIZED ON THIS PROJECT "X"
IP	STORM DRAIN INLET PROTECTION	X
TS	TEMPORARY SEEDING	X
PS	PERMANENT SEEDING	
DC	DUST CONTROL	X
CW	CONCRETE WASHOUT	X
— X — CF	8'-0" CHAIN-LINK FENCE	
— FS — FS	FILTER SOCK	X
— SF — SF	SILT FENCE	X
CD	COVERED AND LEAK PROOF CONSTRUCTION DEBRIS DUMPSTER	X
FC	FUEL CONTAINMENT DYKE AND CHEMICAL STORAGE/MIXING AREA	X
CE	CONSTRUCTION ENTRANCE MAY USE EX ASPHALT IN PLACE	X



CONSTRUCTION SEQUENCE

1. CONTACT STARK SOIL & WATER CONSERVATION DISTRICT TO SCHEDULE A PRE-CONSTRUCTION MEETING AT (330) 451-7645 PRIOR TO ANY EARTH MOVING ACTIVITY.
2. ESTABLISH CONSTRUCTION OFFICE ON SITE. ESTABLISH TEMPORARY POWER, WATER, SANITARY SEWER, TELEPHONE SERVICE, WITH OWNER, GC, SITE CONTRACTOR AND CITY ENGINEER REPRESENTATIVE. ALL TEMPORARY UTILITY SERVICES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. INSTALL 8' TALL GALVANIZED CHAIN LINK FENCE AROUND THE CONSTRUCTION AREA.
4. STAKEOUT LIMITS OF DISTURBANCE.
5. INSTALL INLET PROTECTION OF ANY EXISTING CATCH BASINS.
6. INSTALL ALL PERIMETER SILT FENCE (OR FILTER SOCK) WHERE SHOWN ON PLANS.
7. MAINTAIN TEMPORARY CONTROLS UNTIL REMOVAL IS WARRANTED DUE TO PROGRESSION OF WORK. CONSTRUCTION BMPsSHALL BE IN PLACE PRIOR TO THE START OF CONSTRUCTION ACTIVITIES.
8. STRIP TOPSOIL AND BEGIN EARTHWORK OPERATIONS. CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE OWNER OF LOCATION AND EROSION SEDIMENTATION CONTROL MEASURES IMPLEMENTED AT BORROW OR SPOIL SITE OF IMPORT/EXPORT MATERIAL.
9. ALL SEWER AND UTILITY LINE CONSTRUCTION MAY BEGIN IMMEDIATELY FOLLOWING ESTABLISHMENT OF GRADE AND PERMISSION OF THE OWNER.
10. STABILIZE ALL UTILITY TRENCHES AT THE END OF EACH WORKDAY BY MEANS OF GRAVEL BACKFILL TO SURFACE, RE-PAVING, MULCHING.
11. STABILIZE ALL DISTURBED AREAS WITH TOPSOIL, PERMANENT SEED AND MULCHING IMMEDIATELY UPON REACHING FINAL GRADE.
12. INSTALL PAVEMENT BASE AND PAVEMENT.
13. COMPLETE SITE WORK, PAVEMENT MARKING, FINAL LANDSCAPING AND CLEANUP.
14. RESEED AND REDRESS ANY AREAS THAT MAY REQUIRE ATTENTION IMMEDIATELY. NOTE THAT LAWN AREAS WILL NOT BE DEEMED STABLE UNTIL A UNIFORM 80% COVERAGE IS ACHIEVED.
15. ALL EROSION MEASURES SHALL REMAIN IN PLACE UNTIL THE SITE IS STABILIZED. ALL AREAS OF VEGETATIVE SURFACE STABILIZATION, WHETHER TEMPORARY OR PERMANENT, SHALL BE CONSIDERED TO BE IN PLACE AND FUNCTIONAL WHEN THE REQUIRED UNIFORM RATE OF COVERAGE (80%) IS OBTAINED.
16. IF FOR ANY REASON THE PROJECT IS SUSPENDED, THE CONTRACTOR SHALL ENSURE THAT ALL INSTALLED EROSION MEASURES ARE FUNCTIONING AND PROPERLY MAINTAINED DURING THIS PERIOD, AND THAT ALL DISTURBED SOILS ARE SEEDED AND MULCHED WITH TEMPORARY SEED MIXTURE.

EROSION AND SEDIMENT CONTROL NOTES:

1. THE SMALLEST PRACTICAL AREA OF LAND SHOULD BE EXPOSED AT ANY ONE TIME DURING DEVELOPMENT.
2. WHEN LAND IS EXPOSED DURING DEVELOPMENT, THE EXPOSURE SHOULD BE KEPT TO THE SHORTEST PRACTICAL PERIOD OF TIME.
3. TEMPORARY VEGETATION SHALL BE USED TO PROTECT HIGH EROSION POTENTIAL OR OTHER CRITICAL AREAS EXPOSED DURING DEVELOPMENT. WHEREVEER FEASIBLE, NATURAL VEGETATION SHOULD BE RETAINED AND PROTECTED.
4. THE CONTRACTOR IS TO REFER TO THIS PLAN AND THE E&S PLAN, NOTES. AND DETAILS.
5. THE SITE DEMOLITION AREA IS APPROXIMATELY 1.98 AC. ACTUAL DISTURBED AREA IS APPROXIMATELY 1.98 AC.
6. TEMPORARY SEEDING IS SPECIFIED UNTIL CONSTRUCTION OF FINAL IMPROVEMENTS COMMENCES.
7. THE CONTRACTOR IS TO INSTALL AND MAINTAIN THE E&S CONTROLS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL THE SITE IS FULLY STABILIZED.
8. THE CONTRACTOR IS RESPONSIBLE TO REMOVE THE TEMPORARY E&S CONTROLS ONCE THE SITE IS FULLY STABILIZED.
9. CONTRACTOR IS TO MAINTAIN A LOG DOCUMENTING GRADING AND STABILIZATION ACTIVITIES AS WELL AS AMENDMENTS TO THE SWPPP. PER GENERAL PERMIT REQUIREMENTS. SWP3 INSPECTION REPORTS SHALL BE KEPT ON SITE WITH THE SWP3 AND READILY ACCESSIBLE DURING NORMAL WORKING HOURS.
10. CONTRACTOR IS TO UTILIZE EXISTING PAVEMENT FOR CONSTRUCTION ENTRANCE PER THEIR MEANS AND METHODS.
11. APPLICANT SHALL MAINTAIN COMPLIANCE WITH OHIO EPA'S GENERAL STORMWATER NPDES PERMIT PROGRAMS.
12. APPLICANT SHALL MAINTAIN COMPLIANCE WITH THE CITY OF CANTON AND STATE OF OHIO'S AIR QUALITY REGULATIONS APPLICABLE IN THE CANTON MUNICIPAL CODE AND THE OHIO ADMINISTRATIVE CODE INCLUDING, BUT NOT LIMITED TO THE ASBESTOS AND THE ANTI-NOISE LAWS.
13. ALL WASTE WILL COMPLY WITH APPLICABLE STATE OR LOCAL WASTE DISPOSAL REQUIREMENTS AND PROVISIONS FOR SANITARY WASTES AND CONSTRUCTION AND DEMOLITION DEBRIS. OPEN BURNING IS PROHIBITED.

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REVISIONS:

STATE OF OHIO CHRISTOPHER J. BEDNAR E-68297 REGISTERED PROFESSIONAL ENGINEER 2-24-2022

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

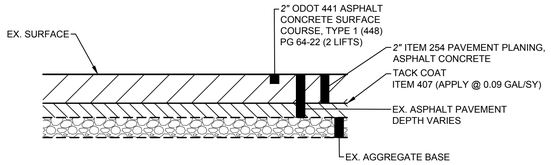
CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG : SWPP PLAN

COMM 17186

DATE 02-24-2022

DWG C-5

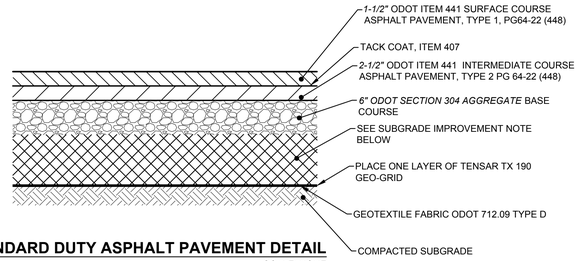


MILLING AND REPAVING DETAIL

SCALE: NONE

NOTES:

1. ALL THICKNESSES SHOWN ARE COMPACTED IN PLACE.
2. TACK COAT TO BE APPLIED IN ACCORDANCE WITH ODOT SPECIFICATIONS
3. MILL BUTT JOINTS WHERE MILLING OPERATION ABUTS ASPHALT PAVEMENT.
4. TAPER NEW PAVEMENT TO MATCH EXISTING PAVEMENT.
5. ADJUST EXISTING CATCH BASIN GRATES, MANHOLE COVERS, AND MISCELLANEOUS CASTINGS AS REQUIRED.
6. ASSURE POSITIVE DRAINAGE DURING MILLING AND REPAVING OPERATIONS (1.5% MINIMUM SLOPE DESIRED, NO BIRD BATHS)



STANDARD DUTY ASPHALT PAVEMENT DETAIL

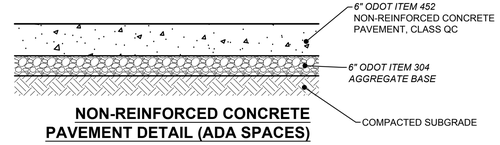
SCALE: NONE

NOTES:

1. ALL THICKNESSES SHOWN ARE COMPACTED IN PLACE.
2. PRIOR TO PAVING, SUBBASE IS TO BE PROOF ROLLED BY CONTRACTOR.
3. TACK COAT TO BE APPLIED IN ACCORDANCE WITH ODOT SPECIFICATIONS
4. WHERE APPLICABLE, REFER TO GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
5. CONTRACTOR IS RESPONSBILE FOR PROOF ROLLING PER THE PROJECT SPECIFICATIONS

SUBGRADE IMPROVEMENT NOTE

CONTRACTOR SHALL PROOF ROLL EXPOSED PAVEMENT SUBGRADE ANY AREAS SHOWING DEFICIENT COMPACTION SHALL BE REMOVED TO 24" BELOW SUBGRADE AS DIRECTED BY ENGINEER AND APPROVED BY OWNER. INSTALL ASTM #1 AND #2 STONE ABOVE ONE LAYER OF TENSAR TX 190 GEO-GRID AND GEOTEXTILE FABRIC ODOT 712.09 TYPE D. CHOKE #1S AND #2S WITH ODOT ITEM 304 AGGREGATE.

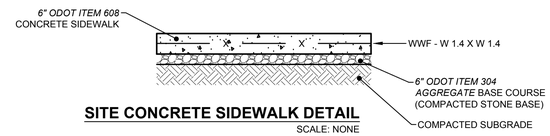


NON-REINFORCED CONCRETE PAVEMENT DETAIL (ADA SPACES)

SCALE: NONE

NOTES:

1. ALL CONCRETE IS TO BE AIR ENTRAINED 4000 PSI (NO FLY ASH), UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. A SINGLE COMPONENT POLYURETHANE, SELF LEVELING CONCRETE SEALANT (SIKA OR APPROVED EQUAL, SEE JOINT DETAILS) IS TO BE APPLIED TO CONCRETE JOINTS AT INTERFACE WITH BUILDING.
3. SLOPE SURFACE TO DRAIN (MIN. 1%).
4. PROOFROLL EXPOSED SUB-GRADE WITH A FULLY LOADED DUMP TRUCK.
5. COMPACT EXPOSED SUB-GRADE TO A MINIMUM OF 98% OF THE LABORATORY DRY DENSITY OF THE SOIL AS DETERMINED BY A STANDARD PROCTOR TEST (ASTM D 698).
6. STABILIZE OR UNDERCUT ANY UNSTABLE AREAS ON A T&M BASIS, APPROVED BY THE OWNER IN ADVANCE.
7. WATER WILL NOT BE ADDED AT JOBSITE. SLUMP MAY BE ADJUSTED WITH HRWR ADMIXTURE. SUBMIT MIX DESIGN TO ENGINEER AND TESTING AGENCY. CONTRACTOR IS TO PAY FOR PROCTOR TEST AND CONCRETE TESTING AGENCY (AIR CONTENT, SLUMP, 7 AND 28 DAY COMPRESSIVE STRENGTH).
8. APPLY SPRAY APPLIED CURING COMPOUND (ASTM C 309, TYPE 1, CLASS B, DISSIPATING).
9. INCLUDE FIBERMESH 650 SYNTHETIC FIBER (OR APPROVED EQUAL) TO CONCRETE AT A MINIMUM RATE OF 3.0 LBS PER C.Y.
10. SURFACE IS TO HAVE A MEDIUM BROOM FINISH PERPENDICULAR TO TRAFFIC FLOW, RUB OUT ALL TOOL MARKS.

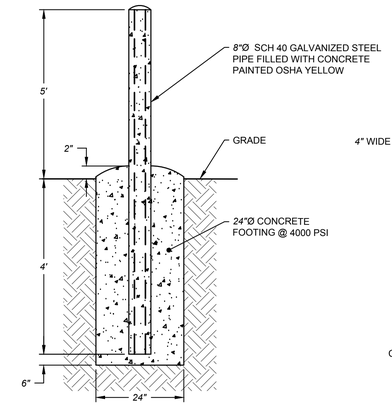


SITE CONCRETE SIDEWALK DETAIL

SCALE: NONE

NOTES:

1. ALL CONCRETE IS TO BE AIR-ENTRAINED 4000 PSI (NO FLY ASH) , UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. SLOPE SURFACE TO DRAIN (MIN 1% MAX 2% CROSS-SLOPE).
3. 1/2" PREFORMED JOINT MATERIAL, CONTINUOUS STRIP SHALL BE INSTALLED EVERY 30' AND / OR BETWEEN SIDEWALK AND ANY FIXED STRUCTURE EXTENDING THE FULL DEPTH OF THE SIDEWALK.
4. SIDEWALK JOINTS SHALL BE DIVIDED INTO EQUALLY SPACED BLOCKS, BUT NOT GREATER THAN 10' O.C. (I.E. 5' INTERVALS FOR 5' WIDE SIDEWALKS). JOINTS SHALL BE HAND TOOLED OR SAW CUT TO A DEPTH OF 1/4" OF THE SLAB THICKNESS.
5. MATERIAL PLACING, FINISHING, AND JOINTING PER DETAILS AND SPECIFICATIONS
6. CONCRETE WALK IS TO HAVE MEDIUM BROOM FINISH PERPENDICULAR TO TRAFFIC FLOW, RUB OUT ALL TOOL MARKS.

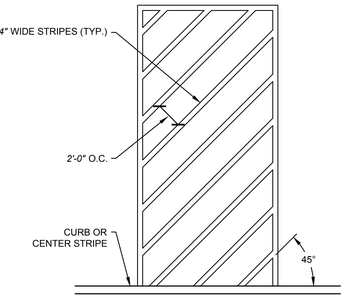


BOLLARD DETAIL

SCALE: NONE

NOTES:

1. ALL CONCRETE SHALL BE 4000 PSI, AIR ENTRAINED, (NO FLY ASH) UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. 1/2" PREFORMED EXPANSION JOIN WHEN ADJACENT TO STRUCTURE.
3. 1/2" FOAM EXP JOINT WITH 1/2" REVEAL FILL JOINT WITH ONE COMPONENT SEALER (SIKA, OR APPROVED EQUAL). SELECT COLOR TO MATCH SURROUNDING PAVEMENT.

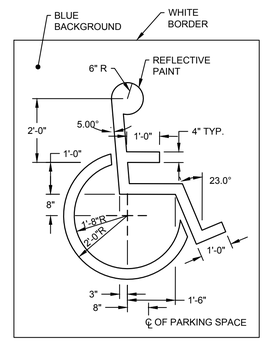


ISLAND STRIPING DETAIL

SCALE: NONE

NOTES:

1. ISLAND STRIPING COLOR: WHITE.
2. CROSSWALK COLOR: WHITE.
3. HANDICAP AREAS COLOR: BLUE.

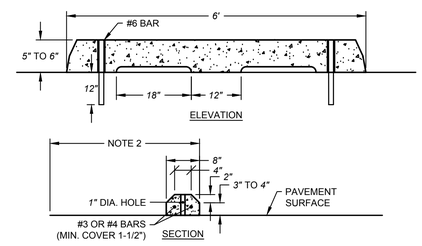


ADA SYMBOL DETAIL

SCALE: NONE

NOTES:

1. SIGNS ARE TO CONFORM TO MUNICIPALITY PARKING STANDARDS.
2. HANDICAP SYMBOL IS TO BE PAINTED WHITE ON BLUE BACKGROUND.

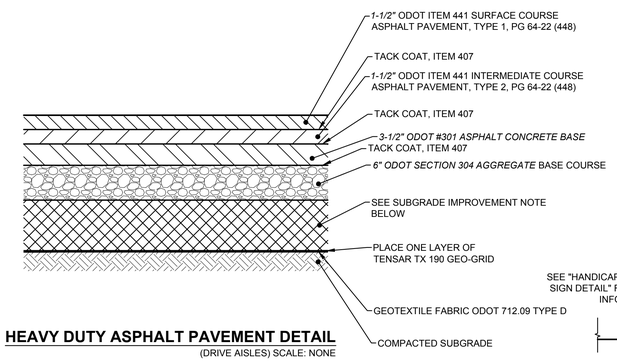


PARKING CONCRETE CURB STOP DETAIL

SCALE: NONE

NOTES:

1. ALL DIMENSIONS ARE NOMINAL.
2. CURB STOP SHALL BE PLACED SO THAT THE DIMENSION FROM THE FACE OF THE CURB STOP TO THE EDGE OF PAVEMENT, FACE OF CURB, OR FACE OF WALK IS AT A MIN. OF 30", AND MAX OF 36".



HEAVY DUTY ASPHALT PAVEMENT DETAIL

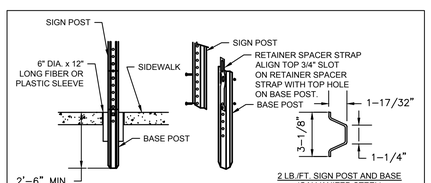
(DRIVE AISLES) SCALE: NONE

NOTES:

1. ALL THICKNESSES SHOWN ARE COMPACTED IN PLACE.
2. PRIOR TO PAVING, SUBBASE IS TO BE PROOF ROLLED BY CONTRACTOR.
3. TACK COAT TO BE APPLIED IN ACCORDANCE WITH ODOT SPECIFICATIONS
4. WHERE APPLICABLE, REFER TO GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
5. CONTRACTOR IS RESPONSBILE FOR PROOF ROLLING PER THE PROJECT SPECIFICATIONS

SUBGRADE IMPROVEMENT NOTE

CONTRACTOR SHALL PROOF ROLL EXPOSED PAVEMENT SUBGRADE ANY AREAS SHOWING DEFICIENT COMPACTION SHALL BE REMOVED TO 24" BELOW SUBGRADE AS DIRECTED BY ENGINEER AND APPROVED BY OWNER. INSTALL ASTM #1 AND #2 STONE ABOVE ONE LAYER OF TENSAR TX 190 GEO-GRID AND GEOTEXTILE FABRIC ODOT 712.09 TYPE D. CHOKE #1S AND #2S WITH ODOT ITEM 304 AGGREGATE.

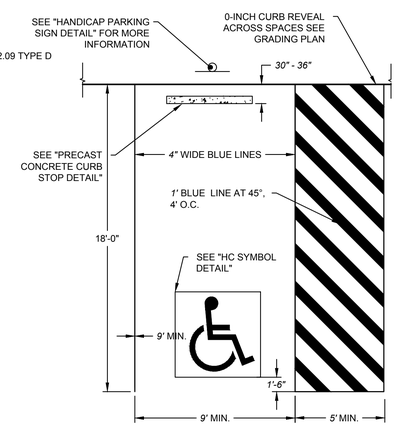


SIGNAGE FOUNDATION DETAIL

SCALE: NONE

NOTES:

1. BASE BOLTS SHALL BE 5/16" - 18 x 1 1/2" GRADE 8 OR ASTM A354.
2. BOLTS AND NUTS SHALL BE WASHER HEAD TYPE OR INSTALLED WITH FLAT WASHERS UNDER BOLT HEAD & NUT.

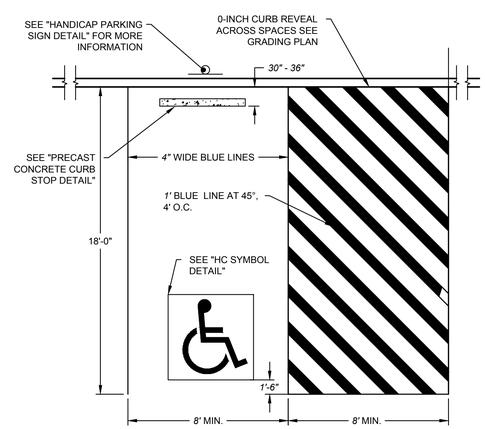


STANDARD ACCESSIBLE PARKING SPACE DETAIL

SCALE: NONE

NOTES:

1. ALL SURFACE SLOPES WITHIN ADA SPCAES SHALL NOT EXCEED 2.00% IN ANY DIRECTION.



VAN ACCESSIBLE PARKING SPACE DETAIL

SCALE: NONE

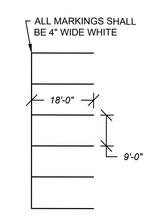
NOTES:

1. ALL SURFACE SLOPES WITHIN ADA SPCAES SHALL NOT EXCEED 2.00% IN ANY DIRECTION.

TRAFFIC CONTROL SCHEDULE

SIGN NUMBER	SIGN	SIZE OF SIGN		DESCRIPTION	MOUNT TYPE	MOUNT HEIGHT SEE NOTE	REMARKS
		WIDTH	HEIGHT				
R7-8	RESERVED PARKING	12"	18"	ACCESSIBLE PARKING	TUBE	7'-0"	REFLECTORIZED SIGN
R7-8A	VAN ACCESSIBLE	12"	6"	VAN PARKING	TUBE	5'-0"	REFLECTORIZED SIGN

NOTE: HEIGHT SHOWN IS FROM GROUND TO BOTTOM OF SIGN



PARKING STALL DETAIL

SCALE: NONE

NOTES:

1. PARKING SPACES AND ISLANDS PER DRIVE AISLE MAY VARY. REFER TO SITE PLAN FOR ADDITIONAL INFORMATION.
2. REFER TO SITE PLAN FOR STRIPING LAYOUT, AND EXCEPTIONS TO THIS DETAIL.
3. SEE PROJECT MANUAL FOR PAVEMENT MARKING SPECS.

FULL SIZE SHEET (24"x36")

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED PROFESSIONAL ENGINEER
2-24-2022

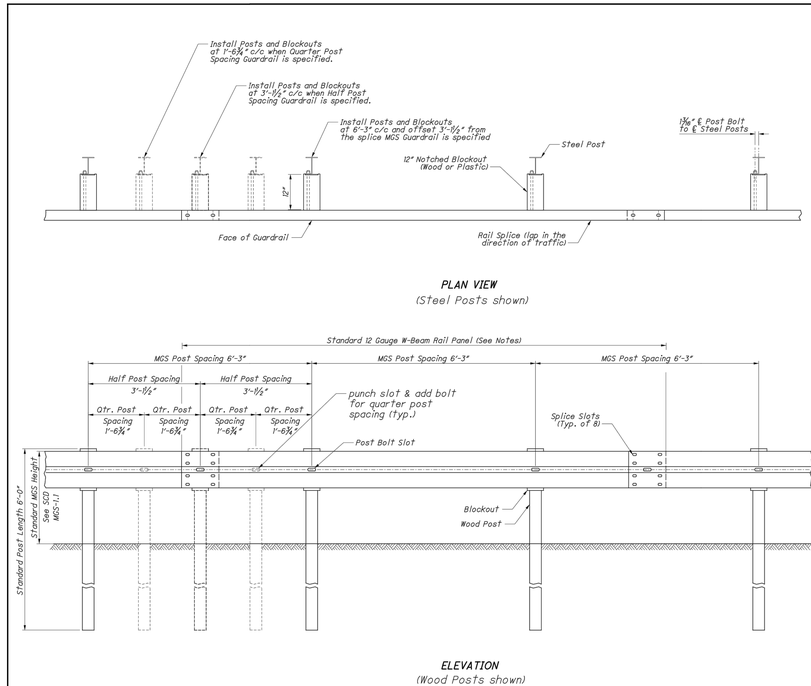
MOTTER & MEADOWS ARCHITECTS
600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG : DETAILS

COMM 17186
DATE 02-24-2022

DWG C-6



NOTES

RAIL: Use W-Beam rail meeting AASHTO M 180-12 Type II Class A, as specified in CMS 606. Either 13'-6¼" long (12'-6" between splices) or 26'-¼" long (25'-0" between splices) rail sections may be used.

POSTS: Posts may be constructed of wood or steel. Use the same type of post throughout the length of the project unless otherwise specified in the plans or permitted by the Engineer.

Wood post shall be fabricated and pressure-treated for approved species as per CMS 710.12. Bore bolt holes and, if required, trim the tops of posts after the posts are set.

See SCD MGS-1.1 for Standard Steel Posts.

All rectangular posts are 6'-0" long (+3", -0 tolerance) unless otherwise in the Contract Document. Posts may be drilled holes or may be driven to grade. Embedment depth shall be 37" when using the round wooden post option.

BLOCKOUTS: Blockout dimensions are dependent on post used. Wood Blockouts are to be pressure treated as specified in CMS 710.14. Bore bolt holes. Approved alternate blockouts may be used in lieu of the wood blockouts shown. The approved list is maintained by the Office of Roadway Engineering.

When terminating double-sided barrier guardrail with an impact attenuator, use reduced 8" deep blockouts on the last 4 posts on the barrier design to accomodate the narrower widths of the attenuators.

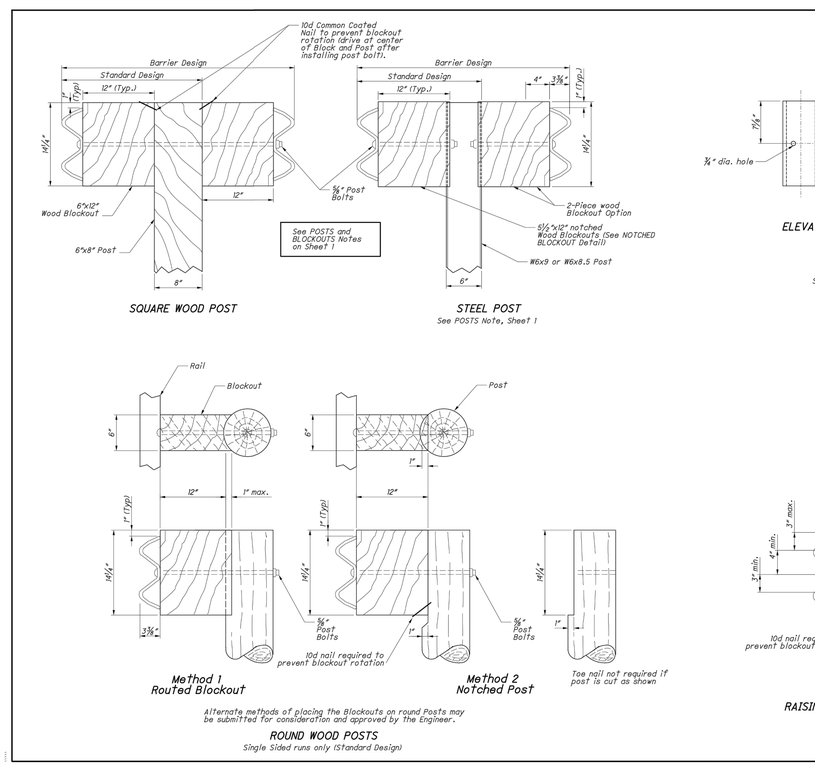
WASHERS: Install appropriate sized standard galvanized steel washers on the nut side of bolts installed on wood posts. Beam washers are not To be used.

DELINEATION: For Barrier Reflectors see CMS 626.

MISCELLANEOUS: For other guardrail details, see SCD MGS-1.1.

PAYMENT: Guardrail is paid in feet per
ITEM 606 - Guardrail, Type MGS.
Half or Quarter Post Spacing Guardrail per
ITEM 606 - Guardrail, Type MGS Half Post Spacing
ITEM 606 - Guardrail, Type MGS Quarter Post Spacing

REVISION DATE 1-19-2018
STATE OF OHIO DEPARTMENT OF TRANSPORTATION ADMINISTRATION BUILDING
David L. Holstein
CADD CHECKER D. Fisher
OFFICE OF ROADWAY ENGINEERING
THIS DRAWING REPLACES MGS-2.1 DATED 7-19-2013
MIDWEST GUARDRAIL SYSTEM- STANDARD TYPE MGS
Regular, Half, & Quarter-Post spacing
SCD NUMBER MGS-2.1
1 / 2



REVISION DATE 1-19-2018
STATE OF OHIO DEPARTMENT OF TRANSPORTATION ADMINISTRATION BUILDING
David L. Holstein
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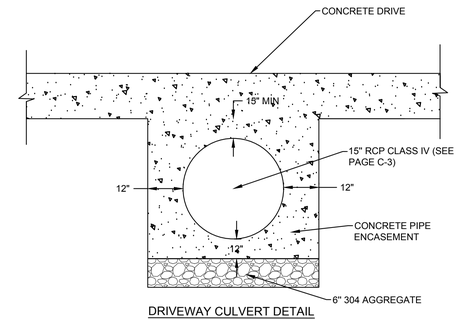
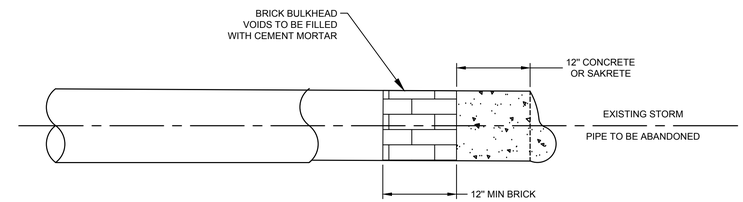
OFFICE OF ROADWAY ENGINEERING
THIS DRAWING REPLACES MGS-2.1 DATED 7-19-2013
MIDWEST GUARDRAIL SYSTEM- STANDARD TYPE MGS
Regular, Half, & Quarter-Post spacing
SCD NUMBER MGS-2.1
2 / 2



DRIVEWAY CULVERT DETAIL

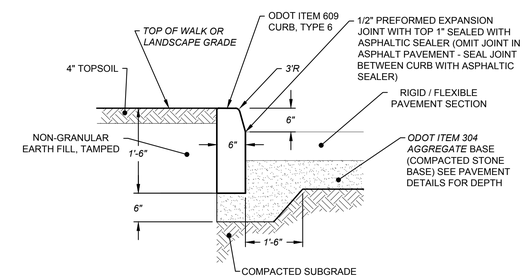
SCALE: NONE



NOTE: PROPERLY DRAIN MAIN PRIOR TO ABANDONMENT

PLUGGING STORM PIPE DETAIL

SCALE: NONE

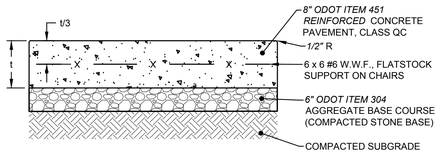


6" CONCRETE CURB DETAIL

SCALE: NONE

NOTES:

1. ALL CONCRETE SHALL BE AIR ENTRAINED 4,000 PSI UNLESS OTHERWISE DIRECTED BY ENGINEER (NO FLY ASH).
2. PROVIDE HOT APPLIED ASPHALTIC SEALER ACCORDING TO ASTM D 3405 AT ALL SURFACES WHERE ASPHALT PAVEMENT ABUTS CONCRETE CURB. APPLY SEALER IN A NEAT, WORKMANSHIP FASHION.
3. INSTALL CONTRACTION JOINT @ 10' O.C.
4. AGGREGATE BASE IS TO EXTEND 12" BEYOND BACK OF CURB.



REINFORCED CONCRETE DETAIL

SCALE: NONE

NOTES:

1. ALL CONCRETE IS TO BE AIR-ENTRAINED 4000 PSI (NO FLY ASH), UNLESS OTHERWISE DIRECTED BY ENGINEER.
2. SLOPE SURFACE TO DRAIN
3. CONCRETE PAVEMENT TO HAVE MEDIUM BROOM FINISH PERPENDICULAR TO TRAFFIC FLOW, RUB OUT ALL TOOL MARKS.
4. PROVIDE EXPANSION JOINTS AT 50'-60' O.C. AND WHERE CONCRETE ABUTS BUILDING, CURBS, OR OTHER STRUCTURES.
5. CONTRACTION JOINTS SHOULD NOT EXCEED 15' O.C.
6. COORDINATE LOCATION OF ALL JOINTS WITH THE ENGINEER.
7. MATERIAL PLACING, FINISHING, AND JOINTING PER DETAILS AND SPECIFICATIONS.

FULL SIZE SHEET (24"x36")

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED
PROFESSIONAL ENGINEERS
2-24-2022

MOLITER & MEADOWS ARCHITECTS
600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
DETAILS

COMM 17186
DATE 02-24-2022

DWG
C-7

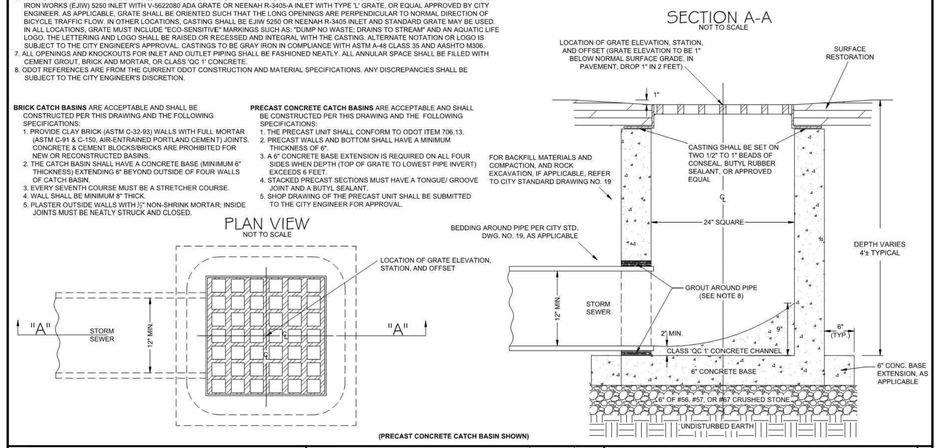
REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED
PROFESSIONAL ENGINEER
2-24-2022

NOTES:
1. ALL WORK SHALL CONFORM TO ODOT ITEM 611 EXCEPT AS OTHERWISE NOTED HEREIN.
2. PRECAST CONCRETE OR BRICK CATCH BASINS ARE ALLOWED AS NOTED HEREIN.
3. IF THE CATCH BASIN WILL BE USED IN A TRAFFIC-BEARING APPLICATION, THE PRECAST CONCRETE PORTION OF AN ODOT 2-2B CATCH BASIN MAY BE USED. HOWEVER, THE INLET FRAME AND GRATE AS SPECIFIED HEREIN SHALL BE USED IN LIEU OF THE ODOT 2-2 "LAY-IN" GRATE. ALL ANNULAR SPACE REMAINING BETWEEN THE BOTTOM OF THE INLET FRAME AND THE TOP OF THE PRECAST SECTION SHALL BE FILLED WITH CEMENT GROUT OR CLASS 'C' CONCRETE. IF THE CATCH BASIN WILL BE USED IN A NON-TRAFFIC-BEARING APPLICATION, AN ODOT 2-2 CATCH BASIN MAY BE USED WITH THE STANDARD "LAY-IN" GRATE.
4. ALL CONCRETE SHALL CONFORM TO ODOT ITEM 499 CLASS QC 1 (4000 psi).
5. A CONCRETE CHANNEL SHALL BE POURED INTO THE BOTTOM OF THE CATCH BASIN USING CLASS 'QC 1' CONCRETE. THE CHANNEL SHALL TAPER FROM 9" THICKNESS TO 2" MIN. THICKNESS AT THE LOWEST SEWER INVERT AND SHALL BE FINISHED WITH A SMOOTH SURFACE.
6. WHERE CATCH BASIN WILL BE LOCATED WITHIN CROSSWALK, AT ADA RAMP, OR IN DESIGNATED BIKE LANE, CASTING SHALL BE EAST JORDAN IRON WORKS (EJIW) 5250 INLET WITH V-062080 ADA GRATE OR NEENAH R-3405-A INLET WITH TYPE 'L' GRATE, OR EQUAL APPROVED BY CITY ENGINEER. AS APPLICABLE, GRATE SHALL BE ORIENTED SUCH THAT THE LONG OPENINGS ARE PERPENDICULAR TO NORMAL DIRECTION OF BICYCLE TRAFFIC FLOW. IN OTHER LOCATIONS, CASTING SHALL BE EJIW 5250 OR NEENAH R-3405 INLET AND STANDARD GRATE MAY BE USED. IN ALL LOCATIONS, GRATE MUST INCLUDE "ECO-SENSITIVE" MARKINGS SUCH AS: "DUMP NO WASTE; DRAINS TO STREAM" AND AN AQUATIC LIFE LOGO. THE LETTERING AND LOGO SHALL BE RAISED OR RECESSED AND INTEGRAL WITH THE CASTING. ALTERNATE NOTATION OR LOGO IS SUBJECT TO THE CITY ENGINEER'S APPROVAL. CASTINGS TO BE GRAY IRON IN COMPLIANCE WITH ASTM A-48 CLASS 35 AND AASHTO M306.
7. ALL OPENINGS AND KNOCKOUTS FOR INLET AND OUTLET PIPING SHALL BE FASHIONED NEATLY. ALL ANNULAR SPACE SHALL BE FILLED WITH CEMENT GROUT, BRICK AND MORTAR, OR CLASS 'QC 1' CONCRETE.
8. ODOT REFERENCES ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.

BRICK CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:
1. PROVIDE CLAY BRICK (ASTM C-32-93) WALLS WITH FULL MORTAR (ASTM C-91 & C-150, AIR-ENTRAINED PORTLAND CEMENT) JOINTS. CONCRETE & CEMENT BLOCKS/BRICKS ARE PROHIBITED FOR NEW OR RECONSTRUCTED BASINS.
2. THE CATCH BASIN SHALL HAVE A CONCRETE BASE (MINIMUM 6" THICKNESS) EXTENDING 6" BEYOND OUTSIDE OF FOUR WALLS OF CATCH BASIN.
3. EVERY SEVENTH COURSE MUST BE A STRETCHER COURSE.
4. WALL SHALL BE MINIMUM 8" THICK.
5. PLASTER OUTSIDE WALLS WITH ½" NON-SHRINK MORTAR; INSIDE JOINTS MUST BE NEATLY STRUCK AND CLOSED.

PRECAST CONCRETE CATCH BASINS ARE ACCEPTABLE AND SHALL BE CONSTRUCTED PER THIS DRAWING AND THE FOLLOWING SPECIFICATIONS:
1. THE PRECAST UNIT SHALL CONFORM TO ODOT ITEM 706.13.
2. PRECAST WALLS AND BOTTOM SHALL HAVE A MINIMUM THICKNESS OF 8".
3. A 6" CONCRETE BASE EXTENSION IS REQUIRED ON ALL FOUR SIDES WHEN DEPTH (TOP OF GRATE TO LOWEST PIPE INVERT) EXCEEDS 6 FEET.
4. STACKED PRECAST SECTIONS MUST HAVE A TONGUE/ GROOVE JOINT AND A BUTYL SEALANT.
5. SHOP DRAWING OF THE PRECAST UNIT SHALL BE SUBMITTED TO THE CITY ENGINEER FOR APPROVAL.

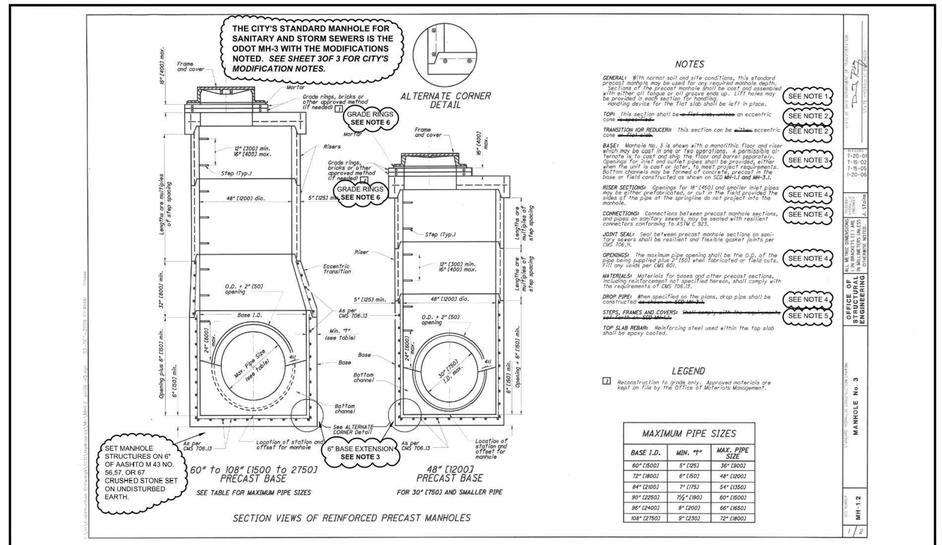


(PRECAST CONCRETE CATCH BASIN SHOWN)

OFFICE OF THE CITY ENGINEER
CANTON, OHIO
DANIEL J. MOEGLIN, P.E., CITY ENGINEER
2436 30th St. NE 44705 : 330-489-3381 : www.cantonohio.gov/engineering

DESCRIPTION	DATE	BY
CAD DRAWING	Mar 2012	RMB
TITLE BLOCK REVISION	2/24/2021	RMB
REVISION TO NOTES AND CONCRETE TYPE.	8/5/2021	RMB

STANDARD DRAWING NO. 4
SQUARE-TOP CATCH BASIN
CE_04_20210805.DWG
1 OF 1



NOTES

GENERAL: With normal soil and site conditions, this standard precast manhole may be used for any required manhole depth. Where the bottom of excavation is unstable, it shall be replaced with either soil fodgee or crushed stone ends up. Lift holes may be provided in each section for handling. Handling device for the flat slab shall be left in place. SEE NOTE 1

TOP: This section shall be ~~flat slab, eccentric~~ or concentric cone ~~as specified~~. SEE NOTE 2

TRANSITION (OR REDUCER): This section can be ~~either~~ eccentric cone ~~or flat slab~~. SEE NOTE 3

BASE: Manhole No. 3 is shown with a monolithic floor and riser which may be used in one or two operations. A permissible alternate is to cast and ship the floor and barrel separately. Openings for inlet and outlet pipes shall be provided, either when the unit is cast or later, to meet project requirements. Inlet and outlet pipes shall be cast in place, grouted into holes or field constructed as shown on SCD MH-1.2 and MH-3.1. SEE NOTE 4

RISER SECTIONS: Openings for 18" (450) and smaller inlet pipes may be either pre-fabricated, or cut in the field provided the edges of the pipe at the springline do not project into the manhole. SEE NOTE 4

CONNECTIONS: Connections between precast manhole sections, and pipes on sanitary sewers, may be sealed with resilient connectors conforming to ASTM C 923. SEE NOTE 4

JOINT SEAL: Seal between precast manhole sections on sanitary sewers shall be resilient and flexible gasket joints per CMS 706.15. SEE NOTE 4

OPENINGS: The maximum pipe opening shall be the O.D. of the pipe being supplied plus 2" (50) shall fabricated on field cuts, 701 any holes per CMS 601. SEE NOTE 4

MATERIALS: Materials for bases and other precast sections, including reinforcement not specified herein, shall comply with the requirements of CMS 706.13. SEE NOTE 4

DROP PIPE: When specified on the plans, drop pipe shall be constructed ~~as shown on SCD DP1~~. SEE NOTE 4

STEPS, FRAMES AND COVERS: ~~Shall comply with the requirements of CMS 706.14.~~ SEE NOTE 5

TOP SLAB REBAR: Reinforcing steel used within the top slab shall be epoxy coated. SEE NOTE 5

LEGEND

R Reconstruction to grade only. Approved materials are kept on file by the Office of Materials Management.

MAXIMUM PIPE SIZES		
BASE I.D.	MIN. "F"	MAX. PIPE SIZE
60" (1500)	5" (125)	36" (900)
72" (1800)	6" (150)	48" (1200)
84" (2100)	7" (175)	54" (1350)
90" (2250)	7½" (190)	60" (1500)
96" (2400)	8" (200)	66" (1650)
108" (2750)	9" (230)	72" (1800)

OFFICE OF THE CITY ENGINEER
CANTON, OHIO
DANIEL J. MOEGLIN, P.E., CITY ENGINEER
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

DESCRIPTION	DATE	BY
CAD DRAWING	JAN 2012	CDB
MODIFIED GRADE RING NOTE 6	09/23/2020	RMB
TITLE BLOCK REVISION	02/26/2021	GML

STANDARD DRAWING NO. 10
PRECAST STORM OR SANITARY MANHOLE
CE_10_20210226.DWG
1 OF 3

NOTES:

1. **BEDDING:**

MATERIALS SHALL BE AASHTO M 43 NO. 56, 57, OR 67 CRUSHED STONE. NO ALTERNATES UNLESS APPROVED BY THE CITY ENGINEER. PRIVATE UTILITIES MAY PROVIDE ALTERNATIVE BEDDING MATERIAL AS APPROVED BY THE CITY ENGINEER.

BEDDING WIDTH TABLE

PIPE TYPE	MIN. WIDTH, TYP.	MAX. WIDTH, TYP.
NON-RIGID PIPE (PVC, HDPE, CMP, ALUMINUM)	**PIPE I.D. x 1.25 + 1'-0"**	**PIPE O.D. + 2'-0"**
RIGID PIPE (CONC., VIT. CLAY, DUCTILE IRON)	**PIPE I.D. x 1.33**	**PIPE O.D. + 2'-0"**

CENTER PIPE HORIZONTALLY WITHIN BEDDING AREA. ANY DEVIATION TO TYPICAL BEDDING REQUIREMENTS ARE SUBJECT TO THE DISCRETION OF THE CITY ENGINEER.

THE BEDDING LIMITS SHOWN APPLY IN ALL CASES *EXCEPT FOR* WHEN PIPE MANUFACTURER SPECIFIES A BEDDING WIDTH DIFFERENT FROM THAT SHOWN AND THE CITY ENGINEER PERMITS SAME.

2. **BACKFILL:**

BACKFILL WITHIN THE PUBLIC STREET R/W:

MATERIALS SHALL BE ODOT 304, 703.11, TYPE "1" GRANULAR MATERIAL OR TYPE "2" GRANULAR MATERIAL, ODOT 613, LOW STRENGTH MORTAR OR ALTERNATE GRANULAR MATERIAL ONLY IF APPROVED BY THE CITY ENGINEER (ALSO, SEE NOTE 5). DEVIATIONS FROM SPECIFIED MATERIALS ARE AS FOLLOWS:

A) NO FOUNDRY SAND OR SLAG IS PERMITTED.

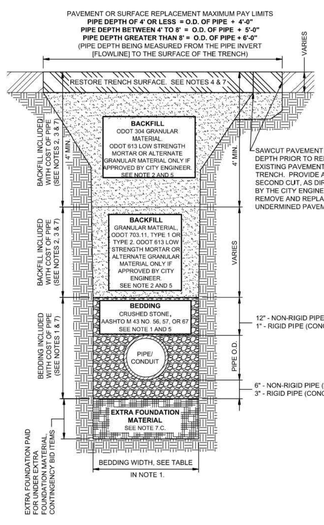
B) ALTERNATE GRANULAR MATERIAL SHALL BE PERMITTED ONLY WITH THE SUPPLEMENTAL APPROVAL OF THE CITY ENGINEER. TO PETITION FOR SUCH SUPPLEMENTAL APPROVAL, THE DEVELOPER/CONTRACTOR SHALL SUBMIT IN WRITING THE FOLLOWING:
* SOURCE OF THE ALTERNATE BACKFILL MATERIAL.
* GRADATION REPORT IN ACCORDANCE WITH AASHTO T II AND T 27.
* PROCTOR CURVE ANALYSIS IN ACCORDANCE WITH ASTM D 698.
* PROPOSED COMPACTION METHOD.

THE CITY ENGINEER RESERVES THE RIGHT TO REFUSE ANY ALTERNATE BACKFILL MATERIAL, REGARDLESS OF APPROVAL OF SIMILAR MATERIAL ON A PREVIOUS PROJECT.

THE CITY ENGINEER FURTHER RESERVES THE RIGHT TO REFUSE ANY ALTERNATE BACKFILL MATERIAL THE CITY FINDS NOT CONSISTENT WITH THE APPROVED SOURCE, GRADATION REPORT, PROCTOR REPORT, OR COMPACTION METHOD.

C) ODOT 703.11, TYPE 2, OR ALTERNATE MATERIALS ARE NOT PERMITTED WITHIN 4 FEET OF THE TRENCH SURFACE, UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.

BACKFILL OUTSIDE OF THE PUBLIC STREET R/W:
MATERIAL MAY BE NON-CONTAMINATED IN-SITU OR EXCAVATED MATERIAL; UNLESS, SPECIFIED OTHERWISE BY PROPERTY OWNER OR PIPE/CONDUIT OWNER.



NOTES: (CONTINUED)

3. **COMPACTION:**

ALL BACKFILL SHALL BE PLACED IN LAYERS NOT TO EXCEED 12-INCHES LOOSE DEPTH AND COMPACTED BY APPROVED MECHANICAL MEANS. JETTING IS NOT APPROVED WITHOUT THE CITY ENGINEER'S APPROVAL. BUCKET COMPACTION MUST BE SUPPLEMENTED WITH VIBRATION OR TAMPING EQUIPMENT AS DIRECTED. ANY MODIFICATIONS TO THESE REQUIREMENTS MUST BE APPROVED BY THE CITY ENGINEER.

4. **SURFACE:**

TRENCHES SHALL BE TOPPED WITH 4" OF ODOT 304 LIMESTONE OR ASPHALT GRINDINGS WITHIN EXISTING STREET PAVEMENTS WHEN THE STREET WILL BE OPENED TO VEHICULAR TRAFFIC PRIOR TO PAVEMENT REPLACEMENT. THE TRENCH TOPPING MATERIAL SHALL BE ROLLED OR OTHERWISE COMPLETED FLUSH WITH THE ADJOINING PAVEMENT.

STREET RESTORATION:
CONCRETE OR ASPHALT STREET PAVEMENT SHALL BE REPLACED IN ACCORDANCE WITH **CITY STD. DWG. NO. 32**. BRICK OR ASPHALT-BRICK COMPOSITE STREET PAVEMENT SHALL BE REPLACED IN ACCORDANCE WITH **CITY STD. DWG. NO. 31**.

SIDEWALK, CURB, AND DRIVEWAY RESTORATION:
DRIVEWAY SURFACES SHALL BE REPLACED IN ACCORDANCE WITH THE **CURRENT EDITION OF THE CITY OF CANTON SPECIFICATIONS FOR THE CONSTRUCTION, REPAIR, AND REPLACEMENT OF SIDEWALKS, CURBS, AND DRIVEWAYS**, AND CITY STD. DWG. NOS. 26 THRU 33.

LAWN RESTORATION:
LAWN SURFACES SHALL BE REPLACED WITH A MINIMUM OF 4" TOPSOIL, SEEDED, AND MULCHED. SEED MIX SHALL CONFORM TO ADJOINING LAWN GRASS.

5. **APPLICABILITY:** THE STANDARD DRAWING HEREIN IS APPLICABLE WHEN ODOT 611 IS NOT SPECIFIED FOR CONDUIT INSTALLATION.

6. **ODOT REFERENCES** ARE FROM THE CURRENT ODOT CONSTRUCTION AND MATERIAL SPECIFICATIONS. ANY DISCREPANCIES SHALL BE SUBJECT TO THE CITY ENGINEER'S DISCRETION.

OFFICE OF THE CITY ENGINEER
CANTON, OHIO
DANIEL J. MOEGLIN, P.E., CITY ENGINEER
2436 30th St. NE 44705 330-489-3381 www.cantonohio.gov/engineering

DESCRIPTION	DATE	BY
REVISION TO NOTES 7 & 8	06/04/2012	CDB
REVISION TO NOTES 7	06/10/2013	CDB
REVISION TO NOTES 2, 3, 5	09/23/2020	RMB
TITLE BLOCK REVISION	02/26/2021	GML
REVISION TO BACKFILL NOTES	3/2/2021	RMB

STANDARD DRAWING NO. 19
UTILITY TRENCH REQUIREMENTS
CE_19_20210226.DWG
1 OF 2

TOP OF SANITARY SEWER MANHOLE COVER
(SEE NOTE 2 FOR STORM SEWER COVER)

NOTES:

1. COVER AND FRAME TO BE CAST OF GRAY IRON IN COMPLIANCE WITH ASTM SPEC. ASTM A-48 CLASS 35 AND AASHTO M 306. CASTINGS SHALL BE OF THE HEAVY DUTY RATING.

2. SANITARY MANHOLE COVER/FRAME
-EAST JORDAN 1850 B VENTED COVER (PRODUCT NO. 185026) AND 1850 FRAME.
-NEENAH R-1654 FRAME AND VENTED COVER.
-OR EQUAL APPROVED BY CITY ENGINEER.

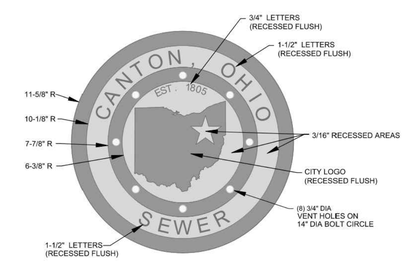
STORM MANHOLE COVER/FRAME
-EAST JORDAN 1850 M GRATED COVER AND 1850 FRAME.
-NEENAH R-1654 FRAME AND GRATED COVER.
-USE THE VENTED COVER WITH CITY LOGO WITHIN CROSSWALKS.

3. MACHINE BEARING SURFACES BETWEEN LID AND FRAME.

4. CONTACT CITY ENGINEER FOR CAD DRAWING OF CITY LOGO.

5. CASTINGS ARE NOT REQUIRED TO BE PAINTED.

6. **ALTERNATE FRAMES**, SUITABLE WITH EJ 1850 COVER, FOR USE AS DIRECTED BY THE CITY ENGINEER:
EAST JORDAN 2015 (10-1/2" FRAME HEIGHT)
EAST JORDAN 1622 (5" FRAME HEIGHT, OR FLAT IF FRAME IS INVERTED)



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DESCRIPTION	DATE	BY
CAD DRAWING	JAN 2012	CDB
MH COVER CITY LOGO	02/28/2014	RMB
NOTE 2 REVISED, ADD GRATED COVER	01/17/2015	RMB
REMOVED OLD CITY LOGO COVER	12/08/2017	RMB
TITLE BLOCK REVISION	02/26/2021	GML

STANDARD DRAWING NO. 12
MANHOLE COVER
CE_12_20210226.DWG
1 OF 1

FULL SIZE SHEET (24"x36")

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

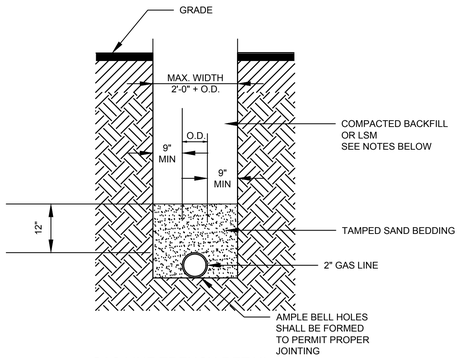
CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

THIS DWG :
DETAILS

COMM 17186
DATE 02-24-2022

DWG
C-8

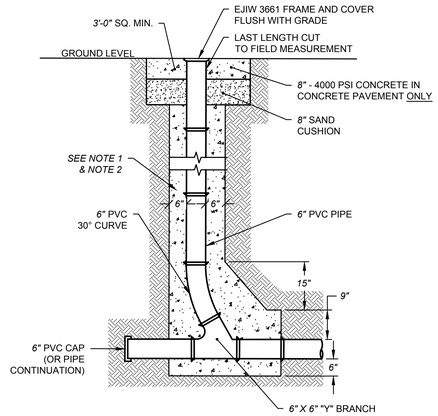


GAS LINE TRENCH DETAIL

NO SCALE

NOTES:

1. PREMIUM BACKFILL CONSISTING OF LOW STRENGTH MORTAR - CONTROLLED DENSITY FILL (LSM) "FLOWABLE FILL" IS REQUIRED AS DIRECTED BY THE ENGINEER.
2. WHEN PREMIUM BACKFILL IS REQUIRED BY THE LOCAL MUNICIPALITY FOR CASES OTHER THAN THOSE LISTED IN NOT 1 ABOVE, IT SHALL BE LIMESTONE GRADED PER ODOT 304.02 OR ODOT 411. NO SLAG IS PERMITTED.
3. CONTRACTOR SHALL USE SPECIAL CARE IN PLACING THE SAND BEDDING, SO AS TO AVOID SCRAPING OF THE EXTERIOR COATING, INJURING THE PIPE, DISTORTING OR MOVING THE PIPE WHEN COMPACTING THE SAME. THE SAND BEDDING SHALL BE TAMPED IN SIX (6) INCH LAYERS, SIMULTANEOUSLY ON EACH SIDE OF THE PIPE, AND THOROUGHLY COMPACTED SO AS TO PROVIDE A SOLID BACKING AGAINST THE EXTERNAL SURFACE OF THE PIPE.
4. MINIMUM COMPACTION FOR ALL SAND BEDDING, BACKFILL AND PREMIUM BACKFILL SHALL BE 95% STANDARD PROCTOR.
5. PAVEMENT, SIDEWALK OR DRIVES TO BE INSTALLED IN ACCORDANCE WITH LOCAL MUNICIPALITY'S SPECIFICATIONS.

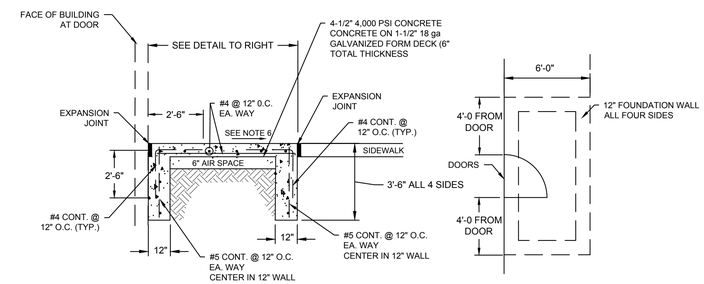


CLEANOUT DETAIL

SCALE: NONE

NOTES:

1. CONCRETE (4000 PSI) ENCASEMENT FOR CLEANOUT IS OPTIONAL WITHIN LANDSCAPE. CONSULT ENGINEER BEFORE PROCEEDING.
2. CONCRETE (4000 PSI) ENCASEMENT FOR CLEANOUT IS REQUIRED WHEN SUBJECT TO TRAFFIC.
3. 8" CLEANOUT SHALL BE USED FOR 8" SEWER AND LARGER.
4. SMALLER SIZE SEWERS AND LAMP HOLES SHALL HAVE SAME SIZE PIPE.
5. CLEANOUT TO HAVE A WATERTIGHT CAP ON RISER.
6. RISER IS TO BE TERMINATED JUST BELOW GRADE. USE C.I. LAMPHOLE FRAME AND COVER WHEN SUBJECT TO TRAFFIC.
7. INSTALL CLEANOUTS ON ALL STORM & SANITARY LINES LEAVING THE BUILDING. LOCATIONS TO BE FIELD DETERMINED.

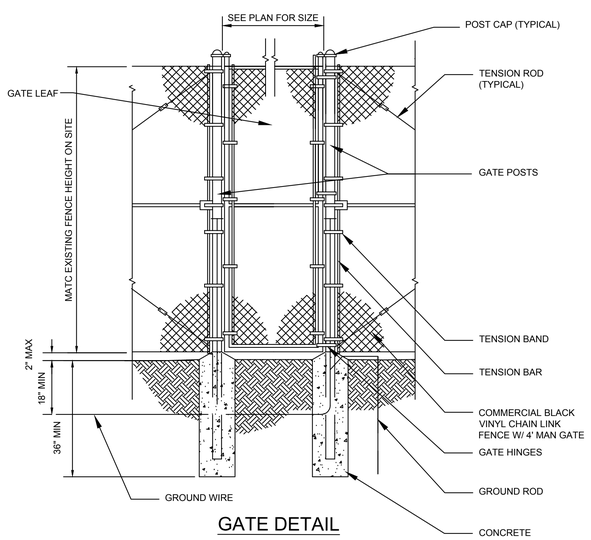


FROST STOOP AT DOORS

SCALE: NONE

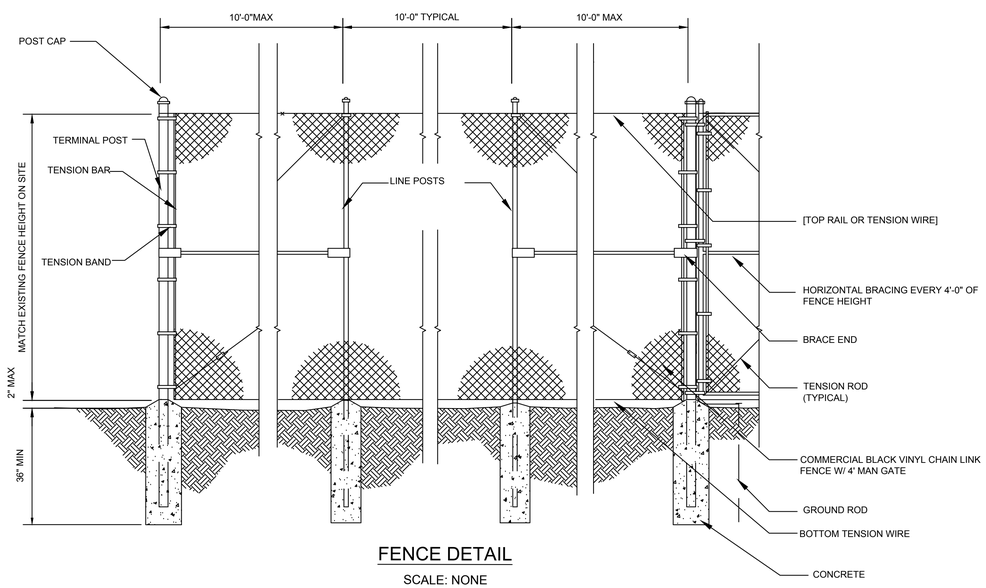
NOTES:

1. ALL CONCRETE SHALL BE AIR ENTRAINED 4000 PSI (NO FLY ASH) UNLESS OTHERWISE DIRECTED BY ENGINEER. CURING COMPOUND PER ODOT 705.07 1GAL / 200SF.
2. USE CHAIRS TO SUPPORT REINFORCEMENT IN WALK.
3. USE EPOXY COATED REBAR. MAINTAIN 2" COVER OVER REINFORCEMENT.
4. PROVIDE STANDARD RUBBED FINISH ON EXPOSED VERTICAL FACE.
6. SLOPE SURFACE TO DRAIN (MIN 1% MAX 2% CROSS-SLOPE).
7. 1/2" PREFORMED JOINT MATERIAL, CONTINUOUS STRIP SHALL BE INSTALLED EVERY 30' AND / OR BETWEEN SIDEWALK AND ANY FIXED STRUCTURE EXTENDING THE FULL DEPTH OF THE SIDEWALK.
8. SIDEWALK JOINTS SHALL BE DIVIDED INTO EQUALLY SPACED BLOCKS, BUT NOT GREATER THAN 10' O.C. (I.E. 5' INTERVALS FOR 5' WIDE SIDEWALKS). JOINTS SHALL BE HAND TOOLED OR SAW CUT TO A DEPTH OF 1/4" OF THE SLAB THICKNESS.
9. MATERIAL PLACING, FINISHING, AND JOINTING PER DETAILS AND SPECIFICATIONS
10. CONCRETE WALK IS TO HAVE MEDIUM BROOM FINISH PERPENDICULAR TO TRAFFIC FLOW, RUB OUT ALL TOOL MARKS.
11. THIS WALK DETAIL IS TO BE USED AT ALL DOORS TO THE BUILDING.



GATE DETAIL

SCALE: NONE



FENCE DETAIL

SCALE: NONE

NOTE:
CONTRACTOR SHALL VERIFY EXISTING FENCE HEIGHT IN ORDER TO DETERMINE FENCE AND GATE BID PRICE.

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED
PROFESSIONAL ENGINEER
2-24-2022

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
DETAILS

COMM 17186
DATE 02-24-2022

DWG
C-9

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

FULL SIZE SHEET (24"x36")

NOTES

1. CONTRACTOR SHALL MAINTAIN COMPLIANCE WITH THE STARK SOIL & WATER CONSERVATION DISTRICT REGULATIONS AS SPECIFIED IN THE STARK COUNTY CODE. SPECIAL ATTENTION MUST BE PAID TO ALL POTENTIAL STORM WATER IMPACTS FROM THE MODIFICATION OF THE SITE, INCLUDING BUT NOT LIMITED TO LONG-TERM OPERATION AND MAINTENANCE OF EXISTING STRUCTURAL AND NON-STRUCTURAL BEST MANAGEMENT PRACTICES.

   A. CONTACT STARK SOIL & WATER CONSERVATION DISTRICT TO SCHEDULE A PRE-CONSTRUCTION MEETING AT (330) 451-7645 PRIOR TO ANY EARTH MOVING ACTIVITY.

   B. CONSTRUCTION BMPS SHALL BE IN PLACE PRIOR TO THE START OF CONSTRUCTION ACTIVITIES.

   C. SWP3 INSPECTION REPORTS SHALL BE KEPT ON SITE WITH THE SWP3 AND READILY ACCESSIBLE DURING NORMAL WORKING HOURS.

2. CONTRACTOR SHALL MAINTAIN COMPLIANCE WITH OHIO EPA'S GENERAL STORMWATER NPDES PERMIT PROGRAMS.

3. CONTRACTOR SHALL MAINTAIN COMPLIANCE WITH THE CITY OF CANTON, STARK SOIL & WATER CONSERVATION DISTRICT, AND STATE OF OHIO'S AIR QUALITY REGULATIONS APPLICABLE IN THE MUNICIPAL CODE AND THE OHIO ADMINISTRATIVE CODE INCLUDING, BUT NOT LIMITED TO THE ASBESTOS AND THE ANTI-NOISE LAWS.

EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR IS TO REFER TO THIS PLAN AND THE E&S PLAN, NOTES. AND DETAILS.

2. CONTRACTOR IS RESPONSIBLE TO MAINTAIN LAWN AND AND STORM WATER CONTROLS UNTIL SUBSTANTIAL COMPLETION OF THE PROJECT. PERIODIC INSPECTIONS ARE REQUIRED PER THE EPA GENERAL PERMIT OHC000005. GENERAL PERMIT TO BE OBTAINED BY CM. CONTRACTOR IS REQUIRED TO KEEP COPY OF PERMIT ON-SITE AND CONFORM WITH PERMIT REQUIREMENTS.

3. THE CONTRACTOR IS TO INSTALL AND MAINTAIN THE E&S CONTROLS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL THE SITE IS FULLY STABILIZED.

4. THE CONTRACTOR IS RESPONSIBLE TO REMOVE THE TEMPORARY E&S CONTROLS ONCE THE SITE IS FULLY STABILIZED.

5. CONTRACTOR IS TO MAINTAIN, ON-SITE AT ALL TIMES, LOGS DOCUMENTING GRADING AND STABILIZATION ACTIVITIES AS WELL AS AMENDMENTS TO THE SWP3. AS REQUIRED BY THE GENERAL PERMIT.

6. DUMPSTERS, WASTE DISPOSAL AREA'S AND OTHER AREAS DESIGNATED UNDER NON-SEDIMENT POLLUTANT CONTROLS WILL BE LOCATED ON-SITE DURING CONSTRUCTION BY THE CONTRACTOR.

7. INCIDENTAL WORK BEYOND APPROXIMATE CONSTRUCTION LIMIT LINE IS TO BE INCLUDED IN BASE BID.

8. CONTRACTOR IS TO PREVENT DUST AND DEBRIS FROM BEING TRACKED OR BLOWN ONTO REGENT AVENUE N.E. OR SURROUNDING PROPERTIES BY USE OF REGULAR SWEEPING, TIRE WASHING, DUST CONTROL METHODS, ETC. EQUIPMENT (POWER BROOM, WATER TRUCK, ETC.) ARE TO REMAIN ON-SITE AS REQUIRED, TO ACCOMMODATE DUST AND DEBRIS. CONTRACTOR IS TO UTILIZE TIRE WASHING STATION DURING CONSTRUCTION ACTIVITIES, IF NEEDED, TO PREVENT DEBRIS FROM REACHING ADJACENT STREETS.

9. IF CONTRACTOR IS NOTIFIED BY POLICE, STARK COUNTY OFFICIALS, OR STARK SOIL & WATER CONSERVATION DISTRICT PERSONNEL OF ANY SIGNIFICANT VIOLATION OF EPA GENERAL PERMIT AND/OR SWPPP PLANS AND INFORMATION, ALL CONSTRUCTION ON-SITE IS TO CEASE UNTIL PROBLEM(S) ARE RECTIFIED & DEEMED ACCEPTABLE.

PHASING OF SITE DEVELOPMENT

- STAKE OUT LIMIT OF DISTURBANCE
- CONTRACTOR SHALL PREVENT CONSTRUCTION DEBRIS FROM BEING TRACKED ONTO PUBLIC ROADWAYS
- THE CONTRACTOR SHALL CLEAN THE ADJACENT PUBLIC ROADWAYS ON A DAILY BASIS
- INSTALL SEDIMENT CONTROL DEVICES AS NOTED ON E&S PLAN
- SITE DEMOLITION
- INSTALL UTILITES, FOUNDATIONS, CURBING, PAVEMENT, ETC.
- FINE GRADE SITE
- MAINTAIN TEMPORARY E&S CONTROLS UNTIL AFTER SUBSTANTIAL COMPLETION AND APPROVAL BY OWNER
- REMOVE TEMPORARY E&S CONTROLS ONCE SITE IS STABILIZED

MAINTENANCE/INSPECTION PROCEDURES

EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES

ALL TEMPORARY AND PERMANENT CONTROL PRACTICES SHALL BE MAINTAINED AND REPAIRED AS NEEDED THROUGHOUT CONSTRUCTION TO ENSURE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION. ALL SEDIMENT CONTROL PRACTICES MUST BE MAINTAINED IN A FUNCTIONAL CONDITION UNTIL ALL UP SLOPE AREAS THEY CONTROL ARE PERMANENTLY STABILIZED.

INSPECTIONS (MINIMUM REQUIREMENTS)

1. ALL CONTROLS ARE TO BE INSPECTED ONCE EVERY SEVEN (7) CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN ONE-HALF INCH OF RAIN PER 24 HOUR PERIOD. THE INSPECTION PERIOD MAY BE REDUCED TO AT LEAST ONCE EVERY MONTH IF THE ENTIRE SITE IS TEMPORARILY STABILIZED OR RUNOFF IS UNLIKELY. ONCE A DEFINABLE AREA HAS BEEN FINALLY STABILIZED NO FURTHER INSPECTION REQUIREMENTS APPLY TO THAT PORTION OF THE SITE.

2. A CHECKLIST MUST BE COMPLETED AND SIGNED BY A QUALIFIED INSPECTION PERSONNEL AND INCLUDE THE FOLLOWING:

- INSPECTION DATE
- NAMES, TITLES, AND QUALIFICATIONS OF PERSONNEL MAKING THE INSPECTION
- WEATHER INFORMATION FOR THE PERIOD SINCE THE LAST INSPECTION OR COMMENCEMENT OF CONSTRUCTION ACTIVITY (INCLUDE ANY STORM ACTIVITY - DURATION, INTENSITY, DISCHARGES)
- LOCATION OF ANY SEDIMENT OR OTHER POLLUTANT DISCHARGES FROM THE SITE
- LOCATION OF BMPS THAT NEED TO BE INSTALLED AND/OR MAINTAINED
- LOCATION OF BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE
- CHECK FOR ANY EVIDENCE OF POLLUTANTS FROM STORED MATERIALS ENTERING THE DRAINAGE SYSTEM
- CORRECTIVE ACTION (INSTALLATION, REPAIRS, MODIFICATIONS TO SWPPP PLAN AND IMPLEMENTATION DATES)
- A MAINTENANCE INSPECTION REPORT WILL BE MADE AFTER EACH INSPECTION. A COPY OF THE REPORT FORM TO BE COMPLETED BY THE INSPECTOR. THE SITE SUPERINTENDENT WILL SELECT INDIVIDUALS WHO WILL BE RESPONSIBLE FOR INSPECTIONS, MAINTENANCE AND REPAIR ACTIVITIES, AND FILLING OUT THE INSPECTION AND MAINTENANCE REPORT.
- COPIES OF THE REPORT ARE TO BE SENT TO THE OWNER, CITY ENGINEER & LOCAL SOIL & WATER CONSERVATION DISTRICT

REPAIR SCHEDULE OF SWPPP CONTROLS

A CONTROL PRACTICE, EXCEPT A SEDIMENT SETTLING POND, THAT IS IN NEED OF REPAIR OR MAINTENANCE MUST BE REPAIRED WITH 3 DAYS OF THE INSPECTION. IF APPLICABLE, SEDIMENT SETTLING PONDS MUST BE REPAIRED OR MAINTAINED WITHIN 10 DAYS OF THE INSPECTION. IF THE SPECIFIED CONTROL PRACTICE IS DEEMED INADEQUATE OR WAS NOT YET INSTALLED A NEW CONTROL PRACTICE MUST BE INSTALLED WITHIN 10 DAYS OF THE INSPECTION.

MAINTENANCE REQUIREMENTS DURING CONSTRUCTION (WHERE APPLICABLE)

A. BUILT UP SEDIMENT WILL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE
B. SILT FENCE WILL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, TO SEE IF THE FABRIC IS SECURELY ATTACHED TO THE FENCE POSTS, AND TO SEE THAT THE FENCE POSTS ARE FIRMLY IN THE GROUND. REPAIRS ARE TO BE MADE PROMPTLY.
C. IF APPLICABLE, THE SEDIMENT BASIN WILL BE INSPECTED FOR DEPTH OF SEDIMENT, AND BUILT UP SEDIMENT WILL BE REMOVED WHEN IT REACHES 40 PERCENT OF THE DESIGN CAPACITY OR AT THE END OF THE JOB.
D. IF APPLICABLE, DIVERSION DIKES WILL BE INSPECTED AND ANY BREACHES PROMPTLY REPAIRED.
E. TEMPORARY AND PERMANENT SEEDING AND PLANTINGS WILL BE INSPECTED FOR BARE SPOTS, WASHOUTS, AND HEALTHY GROWTH.

DEWATERING REQUIREMENTS DURING CONSTRUCTION

THERE SHALL BE NO SEDIMENT-LADEN DISCHARGES TO SURFACE WATERS RESULTING FROM DEWATERING ACTIVITIES. SHOULD DEWATERING BE REQUIRED, E.G., FROM TRENCHES, ETC., DURING CONSTRUCTION, ALL WATER SHALL BE PUMPED TO THE TEMPORARY SEDIMENT BASINS, IF POSSIBLE, BEFORE BEING RELEASED TO DOWNSTREAM CHANNELS, STORM SEWERS, ETC. IF A TEMPORARY SEDIMENT BASIN IS NOT SHOWN ON THE PLAN, OR NOT ACHIEVABLE FOR DEWATERING, THE WATER SHALL BE PUMPED INTO A SEDIMENT TRAP OR THROUGH SEDIMENT BAGS ONTO A RELATIVELY FLAT SURFACE AWAY FROM INLET BASINS, STREAMS, ETC.

HAZARDOUS WASTE
CONSTRUCTION PERSONNEL, INCLUDING SUBCONTRACTORS WHO MAY USE OR HANDLE HAZARDOUS OR TOXIC MATERIALS, SHALL BE MADE AWARE OF THE FOLLOWING GENERAL GUIDELINES REGARDING DISPOSAL AND HANDLING OF HAZARDOUS AND CONSTRUCTION WASTES:

1. PREVENT SPILLS
2. USE PRODUCTS UP
3. FOLLOW LABEL DIRECTIONS FOR DISPOSAL
4. REMOVE LIDS FROM EMPTY BOTTLES AND CANS WHEN DISPOSING IN TRASH
5. RECYCLE WASTES WHENEVER POSSIBLE
6. DON'T POUR INTO WATERWAYS, STORM DRAINS OR ONTO THE GROUND
7. DON'T POUR DOWN THE SINK, FLOOR DRAIN OR SEPTIC TANKS
8. DON'T BURY CHEMICALS OR CONTAINERS
9. DON'T BURN CHEMICALS OR CONTAINERS
10. DON'T MIX CHEMICALS TOGETHER

SPILL REPORTING REQUIREMENTS
SPILLS ON PAVEMENT SHALL BE ABSORBED WITH SAWDUST, KITTY LITTER OR OTHER ABSORBANT MATERIAL AND DISPOSED OF WITH THE TRASH AT A LICENSED SANITARY LANDFILL. HAZARDOUS OR INDUSTRIAL WASTES SUCH AS MOST SOLVENTS, GASOLINE, OIL-BASED PAINTS, AND CEMENT CURING COMPOUNDS REQUIRE SPECIAL HANDLING. SPILLS SHALL BE REPORTED TO OHIO EPA (1-800-282-9378). SPILLS OF 25 GALLONS OR MORE OF PETROLEUM PRODUCTS SHALL BE REPORTED TO OHIO EPA (1-800-282-9378), THE LOCAL FIRE DEPARTMENT, AND THE LOCAL EMERGENCY PLANNING COMMITTEE WITHIN 30 MIN. OF THE DISCOVERY OF THE RELEASE. ALL SPILLS, WHICH RESULT IN CONTACT WITH WATERS OF THE STATE, MUST BE REPORTED TO OHIO EPA'S HOTLINE.

HANDLING CONSTRUCTION CHEMICALS
MIXING, PUMPING, TRANSFERRING OR OTHER HANDLING OF CONSTRUCTION CHEMICALS SUCH AS FERTILIZER, LIME, ASPHALT, CONCRETE DRYING COMPOUNDS, AND ALL OTHER POTENTIALLY HAZARDOUS MATERIALS SHALL BE PERFORMED IN AN AREAAWAY FROM ANY WATERCOURSE, DITCH OR STORM DRAIN.

EQUIPMENT FUELING AND MAINTENANCE
EQUIPMENT FUELING AND MAINTENANCE, OIL CHANGING, ETC., SHALL BE PERFORMED AWAY FROM WATERCOURSES, DITCHES OR STORM DRAINS, IN AN AREA DESIGNATED FOR THAT PURPOSE. THE DESIGNATED AREA SHALL BE EQUIPPED FOR RECYCLING OIL AND CATCHING SPILLS. SECONDARY CONTAINMENT SHALL BE PROVIDED FOR ALL FUEL OIL STORAGE TANKS. THESE AREAS MUST BE INSPECTED EVERY SEVEN DAYS AND WITHIN 24 HRS. OF A 0.5 INCH OR GREATER RAIN EVENT TO ENSURE THERE ARE NO EXPOSED MATERIALS WHICH WOULD CONTAMINATE STORM WATER. SITE OPERATORS MUST BE AWARE THAT SPILL PREVENTION CONTROL AND COUNTERMEASURES (SPCC) REQUIREMENTS MAY APPLY. AN SPCC PLAN IS REQUIRED FOR SITES WITH ONE SINGLE ABOVEGROUND TANK OF 660 GALLONS OR MORE, ACCUMULATIVE ABOVEGROUND STORAGE OF 1330 GALLONS OR MORE, OR 42,000 GALLONS OF UNDERGROUND STORAGE. SOILS THAT HAVE BECOME CONTAMINATED MUST BE DISPOSED OF ACCORDANCE WITH THE "CONTAMINATED SOILS" NOTE.

CONTAMINATED SOILS
IF SUBSTANCES SUCH AS OIL, DIESEL FUEL, HYDRAULIC FLUID, ANTIFREEZE, ETC. ARE SPILLED, LEAKED, OR RELEASED ONTO THE SOIL, THE SOIL SHOULD BE DUG UP AND DISPOSED OF AT LICENSED SANITARY LANDFILL OR OTHER APPROVED PETROLEUM CONTAMINATED SOIL REMEDIATION FACILITY (NOT A CONSTRUCTION/DEMOLITION DEBRIS LANDFILL). PLEASE BE AWARE THAT STORM WATER RUN OFF ASSOCIATED WITH CONTAMINATED SOILS ARE NOT AUTHORIZED UNDER OHIO EPA'S GENERAL STORM WATER PERMIT ASSOCIATED WITH CONSTRUCTION ACTIVITIES. IN THE EVENT THERE ARE LARGE EXTENSIVE AREAS OF CONTAMINATED SOILS ADDITIONAL MEASURES ABOVE AND BEYOND THE CONDITIONS OF OHIO EPA'S GENERAL CONSTRUCTION STORM WATER PERMIT WILL BE REQUIRED.

DEPENDING ON THE EXTENT OF CONTAMINATION, ADDITIONAL TREATMENT AND/OR COLLECTION AND DISPOSAL MAY BE REQUIRED. ALL STORM WATER DISCHARGES ASSOCIATED WITH THE CONTAMINATED SOILS MUST BE AUTHORIZED UNDER AN ALTERNATE NPDES (NATIONAL POLLUTANT DISCHARGE ELIMINATION PERMIT.

CONCRETE WASH WATER/WASH OUTS
CONCRETE WASH WATER SHALL NOT BE ALLOWED TO FLOW TO STREAMS, DITCHES, STORM DRAINS, OR ANY OTHER WATER CONVEYANCE. A SUMP OR PIT WITH NO POTENTIAL FOR DISCHARGE SHALL BE CONSTRUCTED IF NEEDED TO CONTAIN CONCRETE WASH WATER. FIELD TILE OR OTHER SUBSURFACE DRAINAGE STRUCTURES WITHIN 10 FT. OF THE SUMP SHALL BE CUT AND PLUGGED.

CONSTRUCTION WASTE
CONTAINERS SHALL BE PROVIDED FOR THE PROPER COLLECTION OF ALL WASTE MATERIAL INCLUDING CONSTRUCTION DEBRIS, TRASH, PETROLEUM PRODUCTS AND ANY HAZARDOUS MATERIALS USED ON-SITE. CONTAINERS SHALL BE COVERED AND NOT LEAKING. ALL WASTE MATERIAL SHALL BE DISPOSED OF AT FACILITIES APPROVED FOR THAT MATERIAL. CONSTRUCTION DEMOLITION AND DEBRIS (CD&D) WASTE MUST BE DISPOSED OF AT AN OHIO EPA APPROVED CD&D LANDFILL.

NO CONSTRUCTION RELATED WASTE MATERIALS ARE TO BE BURIED ON-SITE. BY EXCEPTION, CLEAN FILL (BRICKS, HARDENED CONCRETE, SOIL) MAY BE UTILIZED IN A WAY WHICH DOES NOT ENCROACH UPON NATURAL WETLANDS, STREAMS OR FLOODPLAINS OR RESULT IN THE CONTAMINATION OF WATERS OF THE STATE.

CONSTRUCTION DEMOLITION AND DEBRIS (CD&D) WASTE MUST BE DISPOSED OF IN ACCORDANCE WITH ORC 3714 AT AN APPROVED OHIO EPA CD&D LANDFILL.

OPEN BURNING
NO MATERIALS MAY BE BURNED WHICH CONTAIN RUBBER, GREASE, ASPHALT, OR PETROLEUM PRODUCTS SUCH AS TIRES, CARS, AUTOPARTS, PLASTICS OR PLASTIC COATED WIRE. (SEE OAC 3745-19)

OPEN BURNING IS NOT ALLOWED IN RESTRICTED AREAS. RESTRICTED AREAS ARE DEFINED AS:

1) WITHIN CORPORATION LIMITS
2) WITHIN 1000 FEET OUTSIDE A MUNICIPAL CORPORATION HAVING A POPULATION OF 1000 TO 10,000
3) A ONE MILE ZONE OUTSIDE OF A CORPORATION OF 10, 000 OR MORE.
4) WITHIN HALF MILE OF A SCHOOL OR PLAYGROUND.

OUTSIDE A RESTRICTED AREA, NO OPEN BURNING CAN TAKE PLACE WITHIN A 1000 FEET OF AN INHABITED BUILDING LOCATED OFF THE PROPERTY WHERE THE FIRE IS SET.

OPEN BURNING IS PERMISSIBLE IN A RESTRICTED AREA FOR THE FOLLOWING ACTIVITIES:

1. HEATING TAR, WELDING AND ACETYLENE TORCHES, SMUDGE POTS AND SIMILAR OCCUPATIONAL NEEDS
2. HEATING FOR WARMTH OR OUTDOOR BARBEQUES. OUTSIDE OF RESTRICTED AREAS

DUST CONTROL/SUPPRESSANTS
DUST CONTROL IS REQUIRED TO PREVENT NUISANCE CONDITIONS. DUST CONTROLS MUST BE USED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND NOT BE APPLIED IN A MANNER, WHICH WOULD RESULT IN A DISCHARGE TO WATERS OF THE STATE. ISOLATION DISTANCES FROM BRIDGES, CATCH BASINS, AND OTHER DRAINAGEWAYS MUST BE OBSERVED. APPLICATION (EXCLUDING WATER) MAY NOT OCCUR WHEN PRECIPITATION IS IMMINENT AS NOTED IN THE SHORT TERM FORECAST. USED OIL MAY NOT BE APPLIED FOR DUST CONTROL.

POST-CONSTRUCTION INSPECTION PROCEDURE

1. (NA) THE SITE SHALL BE MAINTAINED PER THE POST-CONSTRUCTION MAINTENANCE PLAN FOLLOWING THE SUBMITTAL OF THE N.O.T.
2. THE PROPERTY OWNER OR THE OWNER'S AUTHORIZED REPRESENTATIVE(S) IS RESPONSIBLE FOR THE INSPECTION OF THE PERMANENT SWPPP CONTROLS, DISCHARGES FROM THE SITE AND ANY SEDIMENT ACCUMULATIONS.
3. MAINTENANCE COSTS, IF INSPECTED BY THE OWNER OR THE OWNER'S DESIGNATED REPRESENTATIVE(S) WILL BE PAID BY THE OWNER.
4. REGULAR INSPECTIONS, ESPECIALLY FOLLOWING MAJOR STORM EVENTS, WILL REQUIRE AN INSPECTION REPORT THAT SHALL BE KEPT BY THE OWNER FOR A PERIOD OF THREE YEARS. A COPY OF THE REPORT IS TO BE SUBMITTED TO THE STARK SOIL & WATER CONSERVATION DISTRICT.

POST CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

POST-CONSTRUCTION STORM WATER MANAGEMENT PRACTICES TREAT RUNOFF FROM A DEVELOPMENT SITE AFTER CONSTRUCTION IS COMPLETE.

FULL SIZE SHEET (24"x36")

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED PROFESSIONAL ENGINEER
2-24-2022

MOTTER & MEADOWS ARCHITECT & ENGINEER

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
SWPPP NOTES

COMM 17186
DATE 02-24-2022

DWG
ES-1

DUST CONTROL (DC)

DESCRIPTION

DUST CONTROL INVOLVES PREVENTING OR REDUCING DUST FROM EXPOSED SOILS OR OTHER SOURCES DURING LAND DISTURBING, DEMOLITION AND CONSTRUCTION ACTIVITIES TO REDUCE THE PRESENCE OF AIR-BORNE SUBSTANCES WHICH MAY PRESENT HEALTH HAZARDS, TRAFFIC SAFETY PROBLEMS OR HARM ANIMAL OR PLANT LIFE.

SPECIFICATIONS FOR DUST CONTROL

1. VEGETATIVE COVER AND/MULCH - APPLY TEMPORARY OR PERMANENT SEEDING AND MULCH TO AREAS THAT WILL REMAIN IDLE FOR OVER 21 DAYS. SAVING EXISTING TREES AND LARGE SHRUBS WILL ALSO REDUCE SOIL AND AIR MOVEMENT ACROSS DISTURBED AREAS. SEE TEMPORARY SEEDING; PERMANENT SEEDING; MULCHING PRACTICES; AND TREE AND NATURAL AREA PROTECTION PRACTICES.
2. WATERING - SPRAY SITE WITH WATER UNTIL THE SURFACE IS WET BEFORE AND DURING GRADING AND REPEAT AS NEEDED, ESPECIALLY ON HAUL ROADS AND OTHER HEAVY TRAFFIC ROUTES. WATERING SHALL BE DONE AT A RATE THAT PREVENTS DUST BUT DOES NOT CAUSE SOIL EROSION. WETTING AGENTS SHALL BE UTILIZED ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
3. SPRAY-ON ADHESIVES - APPLY ADHESIVE ACCORDING TO THE FOLLOWING TABLE OR MANUFACTURERS' INSTRUCTIONS.
4. STONE - GRADED ROADWAYS AND OTHER SUITABLE AREAS WILL BE STABILIZED USING CRUSHED STONE OR COARSE GRAVEL AS SOON AS PRACTICABLE AFTER REACHING AN INTERIM OR FINAL GRADE. CRUSHED STONE OR COARSE GRAVEL CAN BE USED AS A PERMANENT COVER TO PROVIDE CONTROL OF SOIL EMISSIONS.
5. BARRIERS - EXISTING WINDBREAK VEGETATION SHALL BE MARKED AND PRESERVED. SNOW FENCING OR OTHER SUITABLE BARRIER MAY BE PLACED PERPENDICULAR TO PREVAILING AIR CURRENTS AT INTERVALS OF ABOUT 15 TIMES THE BARRIER HEIGHT TO CONTROL AIR CURRENTS AND BLOWING SOIL.
6. CALCIUM CHLORIDE - THIS CHEMICAL MAY BE APPLIED BY MECHANICAL SPREADER AS LOOSE, DRY GRANULES OR FLAKES AT A RATE THAT KEEPS THE SURFACE MOIST BUT NOT SO HIGH AS TO CAUSE WATER POLLUTION OR PLANT DAMAGE. APPLICATION RATES SHOULD BE STRICTLY IN ACCORDANCE WITH SUPPLIERS' SPECIFIED RATES.
7. OPERATION AND MAINTENANCE - WHEN TEMPORARY DUST CONTROL MEASURES ARE USED; REPETITIVE TREATMENT SHOULD BE APPLIED AS NEEDED TO ACCOMPLISH CONTROL.
   STREET CLEANING - PAVED AREAS THAT HAVE ACCUMULATED SEDIMENT FROM CONSTRUCTION SHOULD BE CLEANED DAILY, OR AS NEEDED, UTILIZING A STREET SWEEPER OR BUCKET -TYPE ENDLOADER OR SCRAPER.

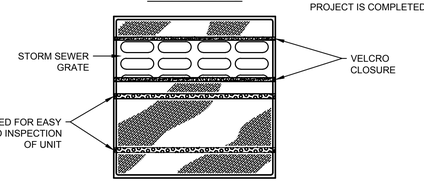
ADHESIVES FOR DUST CONTROL

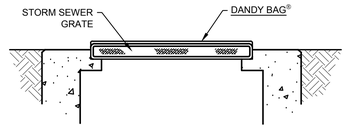
ADHESIVE	WATER DILUTION (ADHESIVE: WATER)	NOZZLE TYPE	APPLICATION RATE (GAL./AC.)
LATEX EMULSION	12.5:1	FINE	235
RESIN IN WATER ACRYLIC EMULSION (NO-TRAFFIC)	4:1	FINE	300
ACRYLIC EMULSION (NO-TRAFFIC)	7:1	COARSE	450
ACRYLIC EMULSION (TRAFFIC)	3.5:1	COARSE	350

INLET PROTECTION (IP)

DANDY BAG®

NOTE:
INSTALL AND MAINTAIN DURING MILLING OPERATIONS AND UNTIL PROJECT IS COMPLETED





NOTE: THE DANDY BAG WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

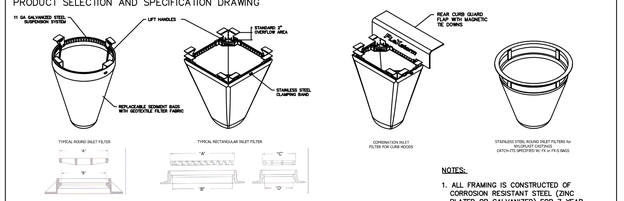
HI-FLOW DANDY BAG® (SAFETY ORANGE)

MECHANICAL PROPERTIES	TEST METHOD	UNITS	MARV
GRAB TENSILE STRENGTH	ASTM D 4632	kN (lbs)	1.62 (365) X 0.89 (200)
GRAB TENSILE ELONGATION	ASTM D 4632	%	24 X 10
PUNCTURE STRENGTH	ASTM D 4833	kN (LBS)	0.40 (90)
MULLEN BURST STRENGTH	ASTM D 3786	KPa (PSI)	3097 (450)
TRAPEZOID TEAR STRENGTH	ASTM D 4533	kN (LBS)	0.51 (115) X 0.33 (75)
UV RESISTANCE	ASTM D 4355	%	90
APPARENT OPENING SIZE	ASTM D 4751	Mm (US STD SIEVE)	0.425 (4)
FLOW RATE	ASTM D 4491	1/MIN/M^2 (GAL/MIN/FT^2)	5907 (145)
PERMITTIVITY	ASTM D 4491	SEC^{-1}	2.1000

*NOTE: ALL DANDY BAGS® CAN BE ORDERED WITH OUR OPTIONAL OIL ABSORBENT PILLOWS

INLET PROTECTION (IP)

FLEXSTORM CATCH–IT FILTERS FOR TEMPORARY INLET PROTECTION
PRODUCT SELECTION AND SPECIFICATION DRAWING



1. UNDERSTAND YOUR FRAME STYLE AND SIZE

STYLE		FRAME STYLE AND SIZE	Frame P/N
ROUND		9 in x 9 in rec/ 11.5 to 20.0" dia grates (A) 8 in	62ARD
		Med Round (20.1" - 26.0" dia grates (A) up to 21" dia openings (B)	62MRD
		Large Round (26.1" - 32.0" dia grates (A) up to 30" opens high (B)	62LRD
		XL Round (32.1" dia - 39" dia grates (A) up to 37" dia open high (B)	62XLRD
RECT / SQUARE		9 in x 9 inch / Square / up to 30" (B) x 30" (D) open high or 64" perimeter	62SSQ
		Med Rect / Square / up to 24" (B) x 24" (D) open height or 96" perimeter	62MSQ
		Large Rect / Square / up to 30" (B) x 30" (D) open height or 120" perimeter	62LSQ
		XL Rect / Square / one side is a curb inlet / up to 40" (B) x 30" (D) open height	62XLSQ
CURBS / INLETS		9 in x 9 inch / square / with front cutting, chipped as its taking inlet / Curb Inlet	62SCB
		Med Rect / Square / with front cutting, chipped as its taking inlet / Curb Inlet	62MCB
		Large Rect / Square / with front cutting, chipped as its taking inlet / Curb Inlet	62LCB
		XL Rect / Square / with front cutting, chipped as its taking inlet / Curb Inlet	62XLCB
MYLOFLUST		12" diameter / Myloflust cast iron / Dike Heavy Steel - Frame (standard)	62S2MI
		15" diameter / Myloflust cast iron / Dike Heavy Steel - Frame (standard)	62S3MI
		18" diameter / Myloflust cast iron / Dike Heavy Steel - Frame (standard)	62S4MI
		24" diameter / Myloflust cast iron / Dike Heavy Steel - Frame (standard)	62MMI
		30" diameter / Myloflust cast iron / Dike Heavy Steel - Frame (standard)	62MMI

2. SELECT YOUR BAG PART NUMBER

FLEXSTORM FILTER BAGS	22" deep Bag (12" Bag Ht)	13" deep Bag (Short Bag 9.5")	Clean Water Flow Rate (GPM/Sq Ft)	Max A.O.S. (US Sieve)
FK Standard Woven Bag	FK	FKS	200	40
CLEAR Fabric Woven Bag	C	CS	45	70

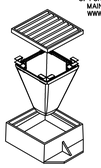
3. CREATE YOUR FLEXSTORM INLET FILTER PART NUMBER

Frame P/N From Step 1. F / for Bag P/N from Step 2.

STANDARD FLEXSTORM FILTER BAGS BY NOMINAL SIZE			
Nominal Bag Size	Solids Storage (Cu Ft)	Filtered Flow Rate at 10% Vac (CFS)	
		FK (Woven)	C (Clear/Woven)
Small	1.6	1.2	0.9
Medium	2.1	1.7	1.1
Large	3.8	2.7	1.9
XL	4.2	3.6	2.5

INSTALLATION:

1. REMOVE GRATE
2. DROP FLEXSTORM INLET FILTER ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE
3. REPLACE GRATE

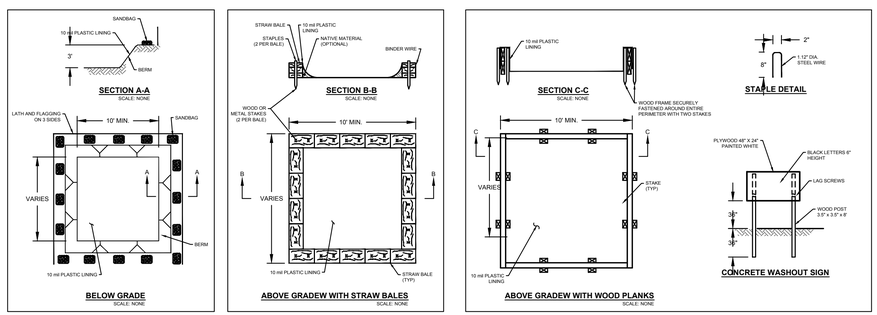


NOTES:

1. ALL FRAMING IS CONSTRUCTED OF CORROSION RESISTANT STEEL (ZINC PLATED OR GALVANIZED) FOR 7 YEAR MINIMUM SERVICE LIFE.
2. UPON ORDERING CONFIRMATION OF THE DOT CALLOUT, PRECAST OR CASTING MAKE AND MODEL, OR DETAILED DIMENSIONAL FORMS MUST BE PROVIDED TO CONFIGURE AND ASSEMBLE YOUR CUSTOMIZED FLEXSTORM INLET FILTER. PART NUMBER ALONE IS NOT SUFFICIENT.
3. FOR WRITTEN SPECIFICATIONS AND MAINTENANCE GUIDELINES VISIT WWW.INLETFILTERS.COM

ALL PRODUCTS MANUFACTURED BY INLET & PIPE PROTECTION, INC A DIVISION OF ADS, INC.
WWW.INLETFILTERS.COM
(866) 287-8655 PH
(866) 382-8659 FX
INFO@INLETFILTERS.COM

SIZE	DWG NO	REV
C	IPP Flexstorm Specifications	A
SCALE	SHEET 1 OF 1	



CONCRETE WASHOUT DETAILS

SCALE: NONE

NOTES:

1. ACTUAL LAYOUT TO BE DETERMINED IN THE FIELD.
2. A CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30'-0" OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE REMOVED FROM THE SITE OF THE WORK AND DISPOSED OF OR RECYCLED.
4. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCE CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE BACKFILLED, REPAIRED, AND STABILIZED TO PREVENT EROSION.

CWA INSTALLATION NOTES

1. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
2. BERM SURROUNDING SIDES AND BACK OF CWA SHALL HAVE A MINIMUM HEIGHT OF 1'-0".
3. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
4. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

CWA MAINTENANCE NOTES

1. INSPECT BMP'S EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMP'S SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMP'S AS SOON AS POSSIBLE (AND ALWAYS WITH 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMP'S IN EFFECTIVE OPERATING CONDITIONS. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMP'S HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'-0".
5. CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
7. WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

FULL SIZE SHEET (24"x36")

Karpinski ENGINEERING
3135 Euclid Ave.
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216-391-3700
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REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
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REGISTERED PROFESSIONAL ENGINEER
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MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
SWPPP DETAILS

COMM 17186
DATE 02-24-2022

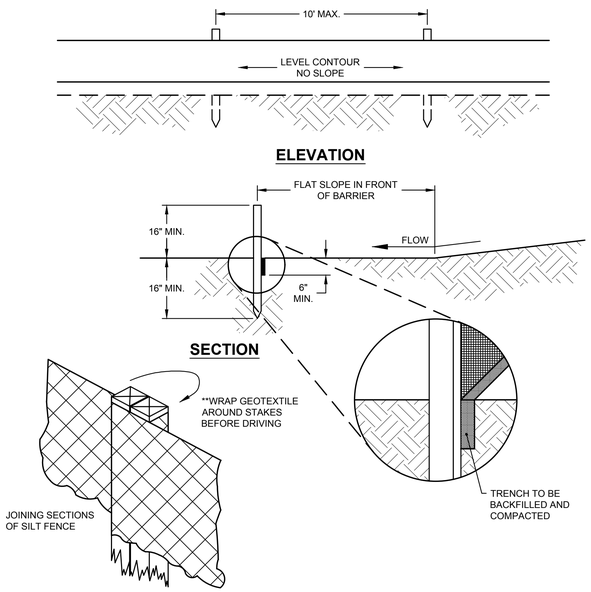
DWG
ES-2

SILT FENCE (SF)

DESCRIPTION

SILT FENCE IS A SEDIMENT-TRAPPING PRACTICE UTILIZING A GEOTEXTILE FENCE, TOPOGRAPHY AND SOMETIMES VEGETATION TO CAUSE SEDIMENT DEPOSITION. SILT FENCE REDUCES RUNOFF'S ABILITY TO TRANSPORT SEDIMENT BY PONDING RUNOFF AND DISSIPATING SMALL RILLS OR CONCENTRATED FLOW INTO UNIFORM SHEET FLOW. SILT FENCE IS USED TO PREVENT SEDIMENT-LADEN SHEET RUNOFF FROM ENTERING INTO DOWNSTREAM CREEKS AND SEWER SYSTEMS.

SPECIFICATIONS FOR SILT FENCE



1. SILT FENCE SHALL BE CONSTRUCTED BEFORE UPSLOPE LAND DISTURBANCE BEGINS.
2. ALL SILT FENCE SHALL BE PLACED AS CLOSE TO THE CONTOUR AS POSSIBLE SO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS THAT MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.
3. ENDS OF THE SILT FENCE SHOULD BE BROUGHT UPSLOPE SLIGHTLY SO THAT WATER PONDED BY THE SILT FENCE WILL BE PREVENTED FROM FLOWING AROUND THE ENDS.
4. SILT FENCE SHALL BE PLACED ON THE FLATTEST AREA AVAILABLE.
5. WHERE POSSIBLE, VEGETATION SHALL BE PRESERVED FOR 5 FEET (OR AS MUCH AS POSSIBLE) UPSLOPE FROM THE SILT FENCE. IF VEGETATION IS REMOVED, IT SHALL BE REESTABLISHED WITHIN 7 DAYS FROM THE INSTALLATION OF THE SILT FENCE.
6. THE HEIGHT OF THE SILT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
7. THE SILT FENCE SHALL BE PLACED IN AN EXCAVATED OR SLICED TRENCH CUT A MINIMUM OF 6 INCHES DEEP. THE TRENCH SHALL BE MADE WITH A TRENCHER, CABLE LAYING MACHINE, SLICING MACHINE, OR OTHER SUITABLE DEVICE THAT WILL ENSURE AN ADEQUATE UNIFORM TRENCH DEPTH.
8. THE SILT FENCE SHALL BE PLACED WITH THE STAKES ON THE DOWNSLOPE SIDE OF THE GEOTEXTILE. A MINIMUM OF 8 INCHES OF GEOTEXTILE MUST BE BELOW THE GROUND SURFACE. EXCESS MATERIAL SHALL LAY ON THE BOTTOM OF THE 6-INCH DEEP TRENCH. THE TRENCH SHALL BE BACKFILLED AND COMPACTED ON BOTH SIDES OF THE FABRIC.
9. SEAMS BETWEEN SECTIONS OF SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST WITH A MINIMUM 6-IN. OVERLAP PRIOR TO DRIVING INTO GROUND, (SEE DETAIL).
10. MAINTENANCE - SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVERTOPS THE SILT FENCE, FLOWS UNDER THE FABRIC OR AROUND THE FENCE ENDS, OR IN ANY OTHER WAY ALLOWS A CONCENTRATED FLOW DISCHARGE, ONE OF THE FOLLOWING SHALL BE PREFORMED, AS APPROPRIATE: 1) THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED, 2) ACCUMULATED SEDIMENT SHALL BE REMOVED, OR 3) OTHER PRACTICES SHALL BE INSTALLED.
    - SEDIMENT DEPOSITS SHALL BE ROUTINELY REMOVED WHEN THE DEPOSIT REACHES APPROXIMATELY ONE-HALF THE HEIGHT OF THE SILT FENCE.
    - SILT FENCES SHALL BE INSPECTED AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. THE LOCATION OF THE EXISTING SILT FENCE SHALL BE REVIEWED DAILY TO ENSURE ITS PROPER LOCATION AND EFFECTIVENESS. IF DAMAGED, THE SILT FENCE SHALL BE REPAIRED IMMEDIATELY.

CRITERIA FOR SILT FENCE MATERIALS:

1. FENCE POST - THE LENGTH SHALL BE A MINIMUM OF 32 INCHES. WOOD POST WILL BE 2-BY-2-IN. NOMINAL DIMENSIONED HARDWOOD OF SOUND QUALITY. THEY SHALL BE FREE OF KNOTS, SPLITS, AND OTHER VISIBLE IMPERFECTIONS, THAT WILL WEAKEN THE POSTS. THE MAXIMUM SPACING BETWEEN POSTS SHALL BE 10 FT. POSTS SHALL BE DRIVEN A MINIMUM 16 INCHES INTO THE GROUND, WHERE POSSIBLE. IF NOT POSSIBLE, THE POSTS SHALL BE ADEQUATELY SECURED TO PREVENT OVERTURNING OF THE FENCE DUE TO SEDIMENT/WATER LOADING.
2. SILT FENCE FABRIC - SEE CHART BELOW.

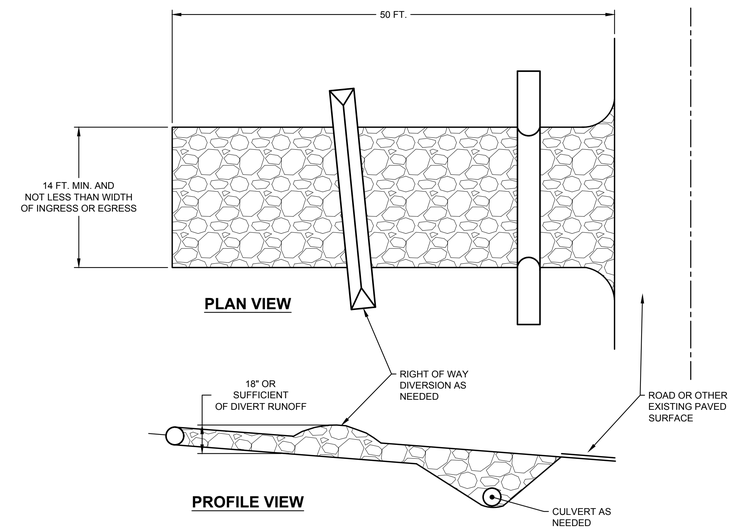
FABRIC PROPERTIES	VALUES	TEST METHOD
MINIMUM TENSILE STRENGTH	120 LBS (535 N)	ASTM D 4632
MAXIMUM ELONGATION AT 60 LBS	50 %	ASTM D 4632
MINIMUM PUNCTURE STRENGTH	50 LBS (220 N)	ASTM D 4833
MINIMUM TEAR STRENGTH	40 LBS (180 N)	ASTM D 4533
APPARENT OPENING SIZE	≤ 0.84 mm	ASTM D 4751
MINIMUM PERMITTIVITY	1×10^{-2} SEC.$^{-1}$	ASTM D 4491
UV EXPOSURE STRENGTH RETENTION	70%	ASTM D 4355

CONSTRUCTION ENTRANCE (CE)

DESCRIPTION

A CONSTRUCTION ENTRANCE IS A STABILIZED PAD OF STONE UNDERLAIN WITH A GEOTEXTILE AND IS USED TO REDUCE THE AMOUNT OF MUD TRACKED OFF-SITE WITH CONSTRUCTION TRAFFIC. LOCATED AT POINTS OF INGRESS/EGRESS, THE PRACTICE IS USED TO REDUCE THE AMOUNT OF MUD TRACKED OFF-SITE WITH CONSTRUCTION TRAFFIC.

SPECIFICATIONS FOR CONSTRUCTION ENTRANCE



1. STONE SIZE - # 2 (1.5-2.5 INCH) STONE SHALL BE USED, OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - THE CONSTRUCTION ENTRANCE SHALL BE AS LONG AS REQUIRED TO STABILIZE HIGH TRAFFIC AREAS BUT NOT LESS THAN 70 FT. (EXCEPTION: APPLY 30 FT. MINIMUM TO SINGLE RESIDENCE LOTS).
3. THICKNESS - THE STONE LAYER SHALL BE AT LEAST 6 INCHES THICK FOR LIGHT DUTY ENTRANCES OR AT LEAST 10 INCHES FOR HEAVY DUTY USE.
4. WIDTH - THE ENTRANCE SHALL BE AT LEAST 14 FEET WIDE, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. GEOTEXTILE - A GEOTEXTILE SHALL BE LAID OVER THE ENTIRE AREA PRIOR TO PLACING STONE. IT SHALL BE COMPOSED OF STRONG ROT-PROOF POLYMERIC FIBERS AND MEET THE FOLLOWING SPECIFICATIONS:

GEOTEXTILE SPECIFICATIONS FOR CONSTRUCTION ENTRANCES	
MINIMUM TENSILE STRENGTH	200 LBS.
MINIMUM PUNCTURE STRENGTH	80 PSI
MINIMUM TEAR STRENGTH	50 LBS
MINIMUM BURST STRENGTH	320 PSI
MINIMUM ELONGATION	20%
EQUIVALENT OPENING SIZE	EOS < 0.6MM
PERMITTIVITY	1×10^{-3} CM/SEC

6. TIMING - THE CONSTRUCTION ENTRANCE SHALL BE INSTALLED AS SOON AS IS PRACTICABLE BEFORE MAJOR GRADING ACTIVITIES.
7. CULVERT - A PIPE OR CULVERT SHALL BE CONSTRUCTED UNDER THE ENTRANCE IF NEEDED TO PREVENT SURFACE WATER FROM FLOWING ACROSS THE ENTRANCE OR TO PREVENT RUNOFF FROM BEING DIRECTED OUT ONTO PAVED SURFACES.
8. WATER BAR - A WATER BAR SHALL BE CONSTRUCTED AS PART OF THE CONSTRUCTION ENTRANCE IF NEEDED TO PREVENT SURFACE RUNOFF FROM FLOWING THE LENGTH OF THE CONSTRUCTION ENTRANCE AND OUT ONTO PAVED SURFACES.
9. MAINTENANCE - TOP DRESSING OF ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND. MUD SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADS, OR ANY SURFACE WHERE RUNOFF IS NOT CHECKED BY SEDIMENT CONTROLS, SHALL BE REMOVED IMMEDIATELY. REMOVAL SHALL BE ACCOMPLISHED BY SCRAPING OR SWEEPING.
10. CONSTRUCTION ENTRANCES SHALL NOT BE RELIED UPON TO REMOVE MUD FROM VEHICLES AND PREVENT OFF-SITE TRACKING. VEHICLES THAT ENTER AND LEAVE THE CONSTRUCTION-SITE SHALL BE RESTRICTED FROM MUDDY AREAS.
11. REMOVAL - THE ENTRANCE SHALL REMAIN IN PLACE UNTIL THE DISTURBED AREA IS STABILIZED OR REPLACED WITH A PERMANENT ROADWAY OR ENTRANCE.

TEMPORARY SEEDING (TS)

DESCRIPTION

TEMPORARY SEEDINGS ESTABLISH TEMPORARY COVER ON DISTURBED AREAS BY PLANTING APPROPRIATE RAPIDLY GROWING ANNUAL GRASSES OR SMALL GRAINS. TEMPORARY SEEDING PROVIDES EROSION CONTROL ON AREAS IN BETWEEN CONSTRUCTION OPERATIONS. GRASSES, WHICH ARE QUICK GROWING, ARE SEEDED AND USUALLY MULCHED TO PROVIDE PROMPT, TEMPORARY SOIL STABILIZATION. IT EFFECTIVELY MINIMIZES THE AREA OF A CONSTRUCTION SITE PRONE TO EROSION AND SHOULD BE USED EVERYWHERE THE SEQUENCE OF CONSTRUCTION OPERATIONS ALLOWS VEGETATION TO BE ESTABLISHED.

SPECIFICATIONS FOR TEMPORARY SEEDING

TEMPORARY SEEDING SPECIES SELECTION			
SEEDING DATES	SPECIES	LB./1,000 SF	LB./ACRE
MARCH 1 TO AUGUST 15	OATS TALL FESCUE ANNUAL RYEGRASS	3 1 1	128 (4 BUSHEL) 40 40
	PERENNIAL RYEGRASS TALL FESCUE ANNUAL RYEGRASS	1 1 1	40 40 40
	ANNUAL RYEGRASS PERENNIAL RYEGRASS CREEPING RED FESCUE KENTUCKY BLUEGRASS	1.25 3.25 0.4 0.4	55 142 17 17
	OATS TALL FESCUE ANNUAL RYEGRASS	3 1 1	128 (3 BUSHEL) 40 40
AUGUST 16 TO NOVEMBER	RYE TALL FESCUE ANNUAL RYEGRASS	3 1 1	112 (2 BUSHEL) 40 40
	WHEAT TALL FESCUE ANNUAL RYEGRASS	3 1 1	120 (2 BUSHEL) 40 40
	PERENNIAL RYEGRASS TALL FESCUE ANNUAL RYEGRASS	1 1 1	40 40 40
	ANNUAL RYEGRASS PERENNIAL RYEGRASS CREEPING RED FESCUE KENTUCKY BLUEGRASS	1.25 3.25 0.4 0.4	40 40 40 0
NOVEMBER 1 TO FEB. 29	USE MULCH ONLY OR DORMANT SEEDING		

NOTE: OTHER APPROVED SPECIES MAY BE SUBSTITUTED.

NOTES:

1. STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES SUCH AS DIVERSIONS AND SEDIMENT TRAPS SHALL BE INSTALLED AND STABILIZED WITH TEMPORARY SEEDING PRIOR TO GRADING THE REST OF THE CONSTRUCTION SITE.
2. TEMPORARY SEED SHALL BE APPLIED BETWEEN CONSTRUCTION OPERATIONS ON SOIL THAT WILL NOT BE GRADED OR REWORKED FOR 21 DAYS OR GREATER. THESE IDLE AREAS SHALL BE SEEDED WITHIN 7 DAYS AFTER GRADING.
3. THE SEEDBED SHOULD BE PULVERIZED AND LOOSE TO ENSURE THE SUCCESS OF ESTABLISHING VEGETATION. TEMPORARY SEEDING SHOULD NOT BE POSTPONED IF IDEAL SEEDBED PREPARATION IS NOT POSSIBLE.
4. SOIL AMENDMENTS - TEMPORARY VEGETATION SEEDING RATES SHALL ESTABLISH ADEQUATE STANDS OF VEGETATION, WHICH MAY REQUIRE THE USE OF SOIL AMENDMENTS. BASE RATES FOR LIME AND FERTILIZER SHALL BE USED.
5. SEEDING METHOD - SEED SHALL BE APPLIED UNIFORMLY WITH A CYCLONE SPREADER, DRILL, CULTIPACKER SEEDER, OR HYDROSEEDER. WHEN FEASIBLE, SEED THAT HAS BEEN BROADCAST SHALL BE COVERED BY RAKING OR DRAGGING AND THEN LIGHTLY TAMPED INTO PLACE USING A ROLLER OR CULTIPACKER. IF HYDROSEEDING IS USED, THE SEED AND FERTILIZER WILL BE MIXED ON-SITE AND THE SEEDING SHALL BE DONE IMMEDIATELY AND WITHOUT INTERRUPTION.

MULCHING TEMPORARY SEEDING

1. APPLICATIONS OF TEMPORARY SEEDING SHALL INCLUDE MULCH, WHICH SHALL BE APPLIED DURING OR IMMEDIATELY AFTER SEEDING. SEEDINGS MADE DURING OPTIMUM SEEDING DATES ON FAVORABLE, VERY FLAT SOIL CONDITIONS MAY NOT NEED MULCH TO ACHIEVE ADEQUATE STABILIZATION.
2. MATERIALS:
    - STRAW - IF STRAW IS USED, IT SHALL BE UNROTTED SMALL-GRAIN STRAW APPLIED AT A RATE OF 2 TONS/ACRE OR 90 LBS./1,000 SQ.-FT. (2-3 BALES)
    - HYDROSEEDERS - IF WOOD CELLULOSE FIBER IS USED, IT SHALL BE USED AT 2,000 LBS./AC. OR 46 LB./1,000 SQ.-FT.
    - OTHER - OTHER ACCEPTABLE MULCHES INCLUDE MULCH MATTINGS APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS OR WOOD CHIPS APPLIED AT 6 TON/AC.
3. STRAW MULCH SHALL BE ANCHORED IMMEDIATELY TO MINIMIZE LOSS BY WIND OR WATER. ANCHORING METHODS:
    - MECHANICAL - A DISK, CRIMPER, OR SIMILAR TYPE TOOL SHALL BE SET STRAIGHT TO PUNCH OR ANCHOR THE MULCH MATERIAL INTO THE SOIL. STRAW MECHANICALLY ANCHORED SHALL NOT BE FINELY CHOPPED BUT LEFT TO A LENGTH OF APPROXIMATELY 6 INCHES.
    - MULCH NETTING - NETTING SHALL BE USED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. NETTING MAY BE NECESSARY TO HOLD MULCH IN PLACE IN AREAS OF CONCENTRATED RUNOFF AND ON CRITICAL SLOPES.
    - SYNTHETIC BINDERS - SYNTHETIC BINDERS SUCH AS ACRYLIC DLR (AGRI-TAC), DCA-70, PETROSET, TERRA TRACK OR EQUIVALENT MAY BE USED AT RATES RECOMMENDED BY THE MANUFACTURER.
    - WOOD-CELLULOSE FIBER - WOOD -CELLULOSE FIBER BINDER SHALL BE APPLIED AT A NET DRY WT. OF 750 LB./AC. THE WOOD-CELLULOSE FIBER SHALL BE MIXED WITH WATER AND THE MIXTURE SHALL CONTAIN A MAXIMUM OF 50 LB./100 GAL.

FULL SIZE SHEET (24"x36")

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED
PROFESSIONAL ENGINEERS
2-24-2022

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
SWPPP DETAILS

COMM 17186
DATE 02-24-2022

DWG
ES-3

REVISIONS:

STATE OF OHIO
CHRISTOPHER J. BEDNAR
E-68297
REGISTERED
PROFESSIONAL ENGINEERS
2-24-2022

SWPPP GRADING AND STABILIZATION ACTIVITIES LOG

PROJECT NAME

DATE GRADING ACTIVITY INITIATED	DESCRIPTION OF GRADING ACTIVITY	DATE GRADING ACTIVITY CEASED (INDICATE TEMPORARY OR PERMANENT)	DATE WHEN STABILIZATION MEASURES ARE INITIATED	DESCRIPTION OF STABILIZATION MEASURE AND LOCATION

SWPPP INSPECTION REPORT LOG

PROJECT NAME

INSPECTION #	INSPECTOR NAME	DATE OF INSPECTION	RAIN EVENT	TYPE OF CORRECTIVE ACTION REQUIRED

SWPPP AMENDMENT LOG

PROJECT NAME

AMENDMENT NUMBER	DESCRIPTION OF AMENDMENT	DATE OF AMENDMENT	AMENDMENT PREPARED BY

SWPPP CORRECTIVE ACTION LOG

PROJECT NAME

INSPECTION DATE	INSPECTOR NAME	DESCRIPTION OF CORRECTIVE ACTION NEEDED (FORM INSPECTION REPORT)	CORRECTIVE ACTION TAKEN	DATE ACTION TAKEN

Karpinski ENGINEERING
3135 Euclid Ave.
Cleveland, OH 44115
216-391-3700
karpinskieng.com

FULL SIZE SHEET (24"x36")

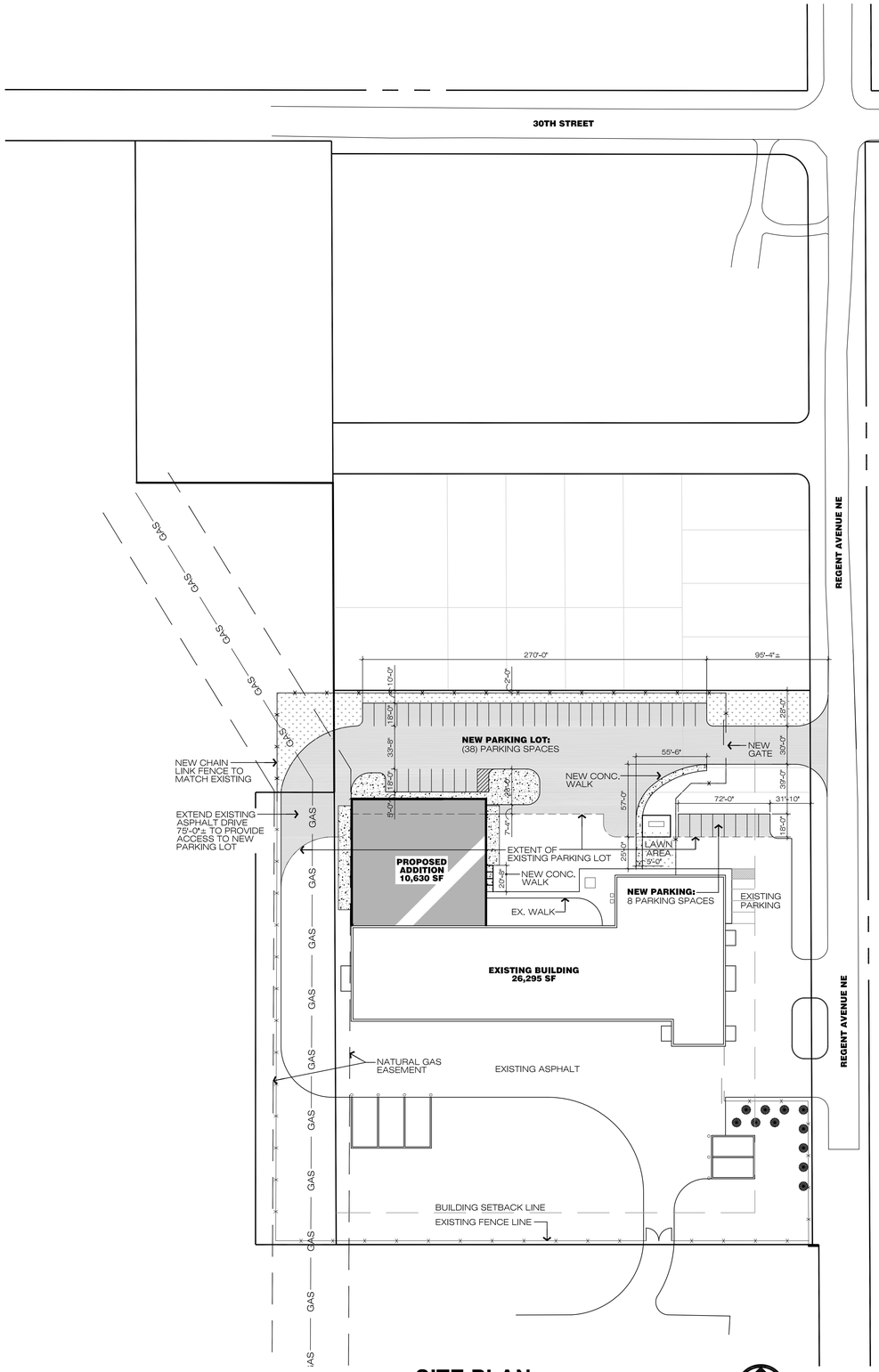
MOTTER & MEADOWS ARCHITECTS
600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

THIS DWG :
SWPPP DETAILS

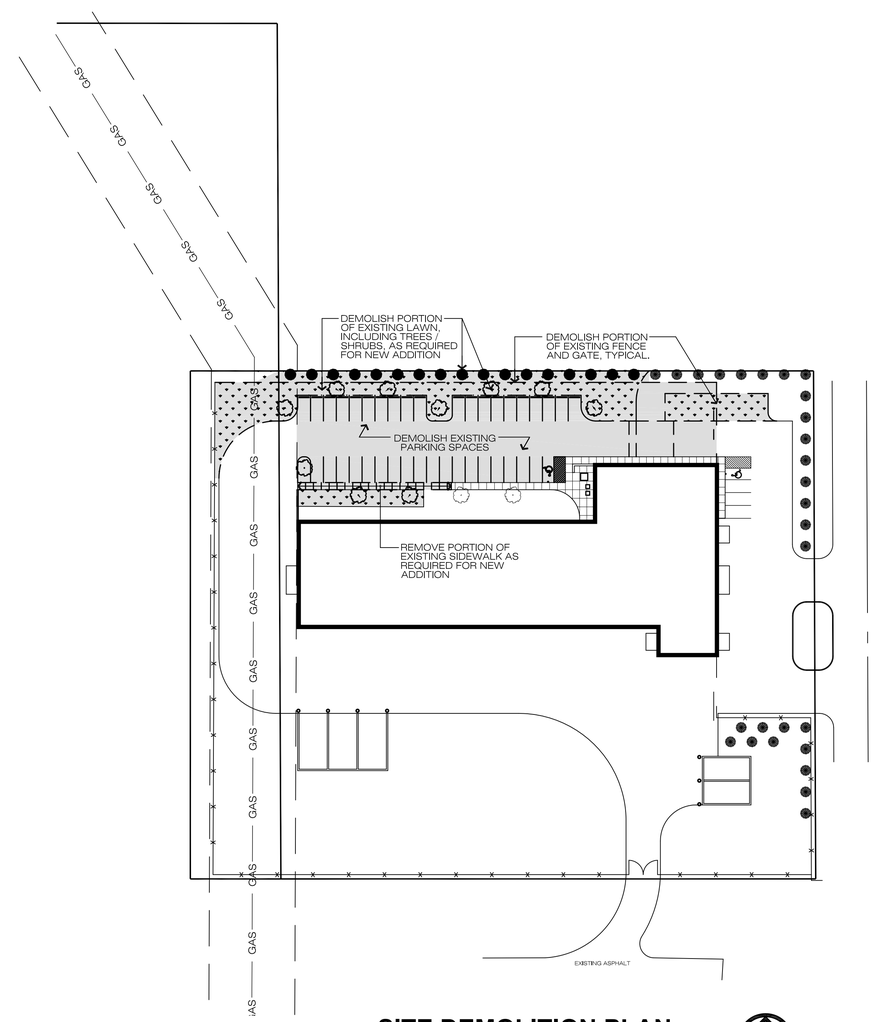
COMM 17186
DATE 02-24-2022

DWG
ES-4



SITE PLAN

SCALE: 1" = 50'-0"



SITE DEMOLITION PLAN

SCALE: 1" = 50'-0"

REVISIONS:

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS
ARCHITECTS

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND ADMINISTRATION OFFICES RENOVATION
2901 REGENT AVENUE NE
CANTON, OHIO 44705

STATE OF OHIO
R.W.MEADOWS
6781
REGISTERED ARCHITECT
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
SITE PLAN
SITE DEMOLITION PLAN

COMM 17186
DATE 02-24-2022

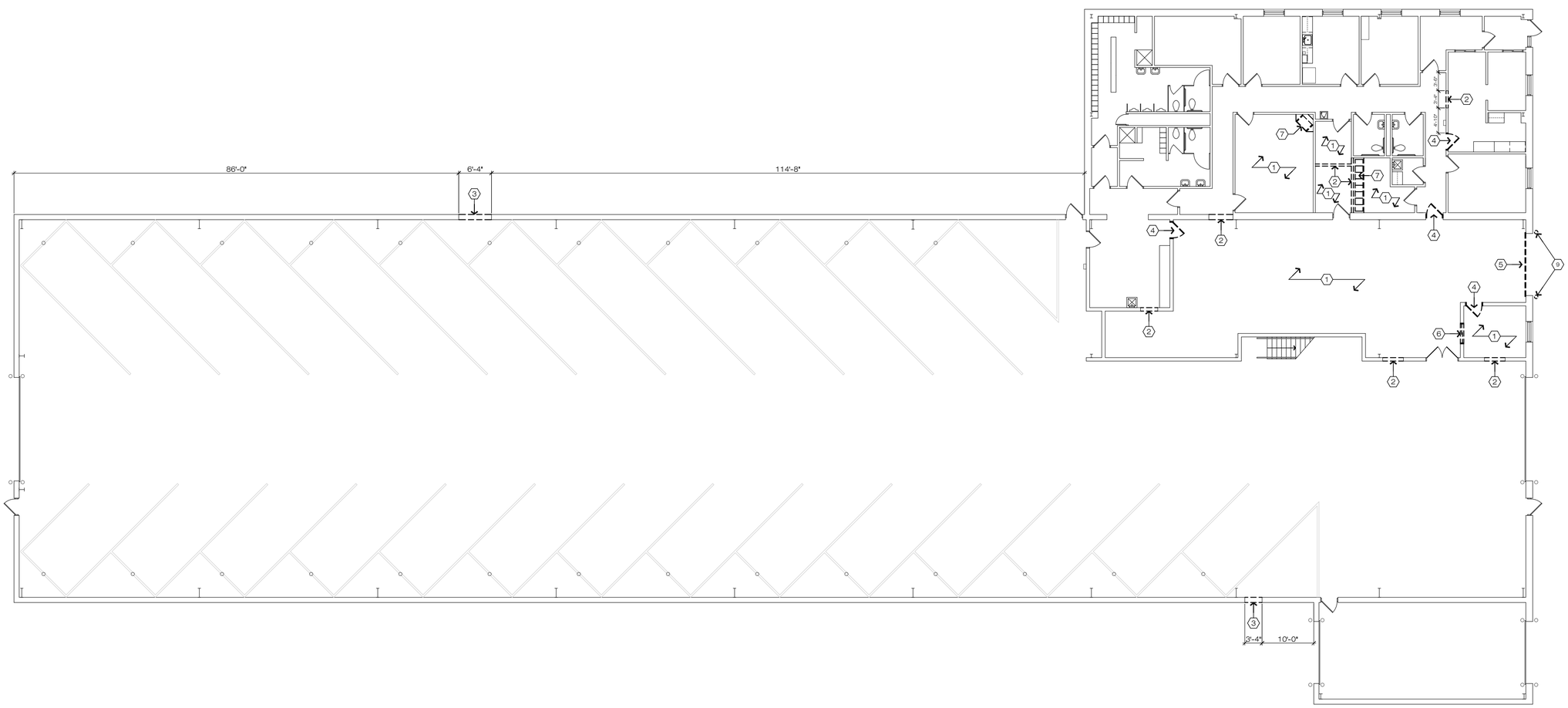
ISSUED FOR BID

DWG
A-1.1

REVISIONS:

FLOOR PLAN DEMOLITION LEGEND

1. REMOVE EXISTING FLOORING AND ASSOCIATED BASE
2. REMOVE EXISTING INTERIOR WALL
3. REMOVE PORTION OF EXISTING EXTERIOR WALL AS REQUIRED FOR NEW OPENING
4. REMOVE EXISTING DOOR AND FRAME
5. REMOVE EXISTING OVERHEAD DOOR AND TRACK OPERATOR, SALVAGE FOR RE-INSTALL
6. REMOVE EXISTING INTERIOR WINDOW
7. REMOVE EXISTING FILE STORAGE / CASEWORK
8. REMOVE EXISTING DRINKING FOUNTAIN / PLUMBING FIXTURE
9. REMOVE EXISTING BOLLARDS



DEMOLITION FLOOR PLAN

SCALE: 3/32" = 1'-0"

N

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND ADMINISTRATION OFFICES RENOVATION
2901 REGENT AVENUE NE
CANTON, OHIO 44705

STATE OF OHIO
R.W.MEADOWS
6781
REGISTERED ARCHITECT

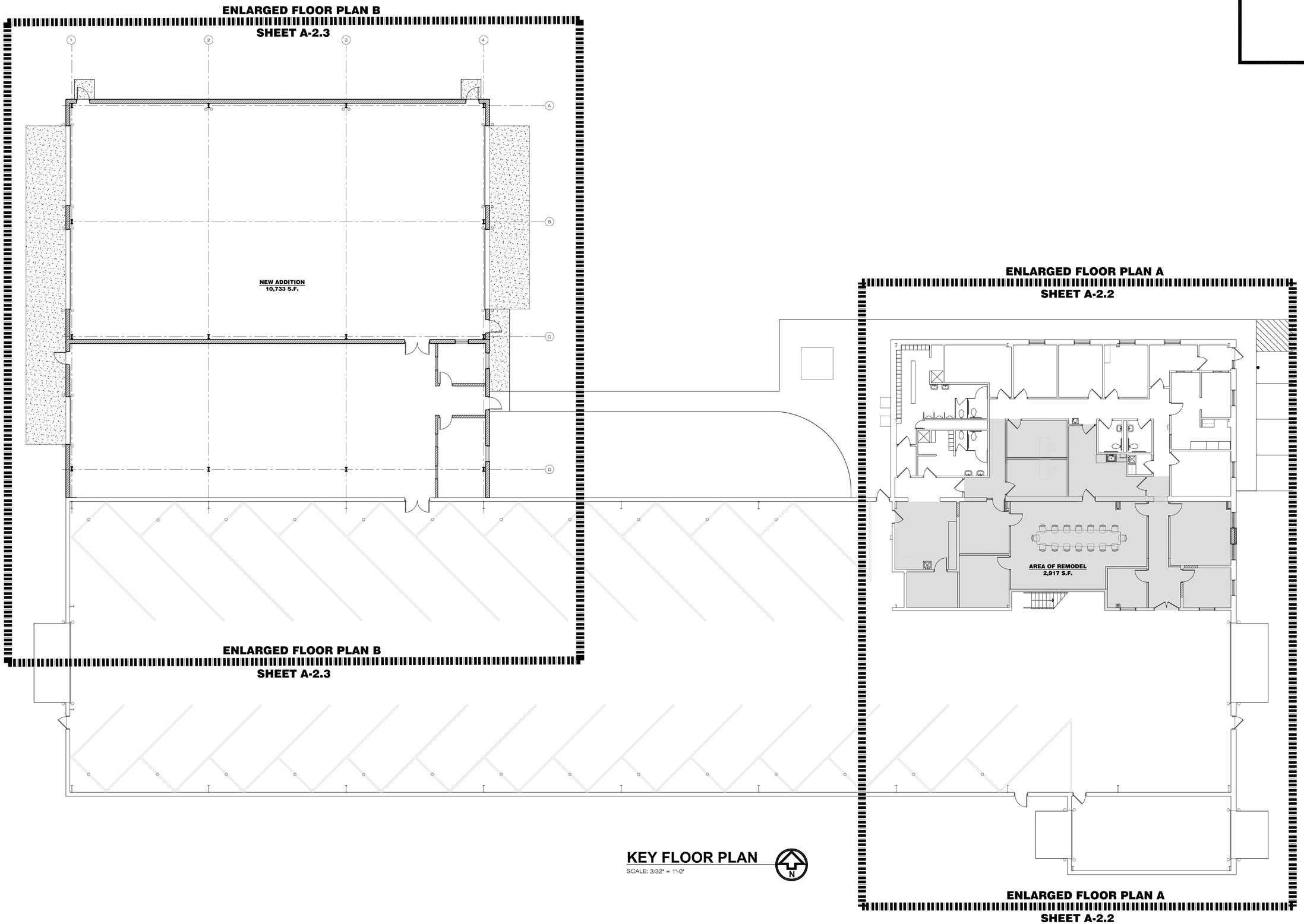
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
ENLARGED FLOOR PLAN

COMM 17186
DATE 02-24-2022

DWG
D-1.1

ISSUED FOR BID



REVISIONS:

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS
ARCHITECTS

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND ADMINISTRATION OFFICES RENOVATION
2901 REGENT AVENUE NE
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STATE OF OHIO
R.W.MEADOWS
6781
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RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
KEY PLAN

COMM 17186
DATE 02-24-2022

DWG
A-2.1

ISSUED FOR BID

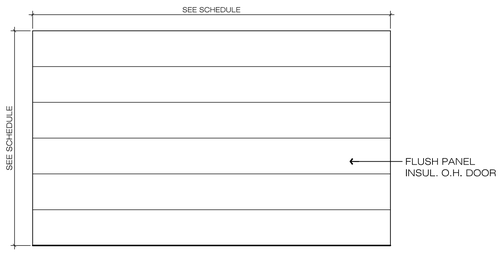
ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR MATERIAL: CARPET	FLOOR MATERIAL: VCT	FLOOR MATERIAL: EXISTING TO REMAIN	BASE MATERIAL: 4" COVE RUBBER	BASE MATERIAL: EXISTING TO REMAIN	WALLS MATERIAL: EXISTING TO REMAIN	WALLS MATERIAL: GYPSUM DRYWALL	WALLS MATERIAL: EXISTING TO REMAIN	WALLS MATERIAL: PAINT	CEILING MATERIAL: 2x4 ACOUSTICAL CEILING TILE	CEILING MATERIAL:	CEILING MATERIAL: EXISTING TO REMAIN	HEIGHT
EXISTING BUILDING														
C101	CORRIDOR			O			O			O	O			
C102	CORRIDOR			O	O		O	O		O	O			
C103	CORRIDOR			O			O			O	O			
C104	CORRIDOR			O			O			O	O			
C105	CORRIDOR	O			O			O			O	O		8'-8"
100	EX. VESTIBULE			O			O				O			
101	EX. WAITING			O			O			O	O			
102	EX. RECEPTION			O			O			O	O			
103	EX. WORK ROOM			O			O	O		O	O			
104	EX. OFFICE			O			O			O	O			
105	OFFICE	O			O			O			O	O		8'-8"
106	OFFICE	O			O				O	O	O	O		8'-8"
107	OFFICE	O			O			O			O	O		8'-8"
108	CONFERENCE ROOM	O			O			O			O	O		8'-8"
109	OFFICE	O			O			O			O	O		8'-8"
110	SMALL CONFERENCE ROOM	O			O			O			O	O		8'-8"
111	FILE STORAGE		O		O			O		O	O	O		8'-8"
112	VEND. / RADIO STORAGE			O	O		O		O	O	O			
113	EX. VESTIBULE			O			O			O	O			
114	EX. LOCKER & RESTROOM			O			O			O	O			
115	EX. LOCKER & RESTROOM			O			O			O	O			
116	EX. MECHANICAL			O			O			O	O			
117	EX. OFFICE			O			O			O	O			
118	EX. OFFICE			O			O			O	O			
119	EX. OFFICE			O			O			O	O			
120	EX. RESTROOM			O			O			O	O			
121	EX. RESTROOM			O			O			O	O			
122	EX. JANITOR			O			O			O	O			
123	KITCHEN & STORAGE		O		O					O	O	O		9'-0"
124	OFFICE	O			O				O	O	O	O		9'-0"
125	OFFICE	O			O				O	O	O	O		9'-0"
126	EX. GARAGE				O		O			O				
127	EX. WASH BAY				O		O			O				
NEW ADDITION														
A101	GARAGE			O		O			O		O		O	
A102	STOCK ROOM			O		O			O	O	O		O	
A103	OFFICE			O		O				O		O	O	9'-0"
A104	STORAGE			O		O				O	O	O	O	9'-0"
A105	CORRIDOR			O		O				O		O		

WALL TYPE LEGEND

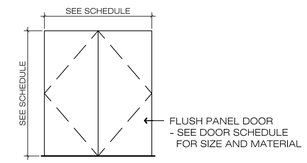
- EXISTING WALL TO REMAIN
- NEW EXTERIOR WALL CONSTRUCTION TO MATCH EXISTING -SEE WALL SECTION(S)
- EXISTING CMU WALL WITH NEW 3-5/8" - 25 GA. STEEL STUDS @ 16" O.C. W/ 5/8" TYPE 'X' GYPSUM DRYWALL ON EXPOSED SIDE - FULL HEIGHT TO 2" ABOVE FINISH CEILING
- EXISTING CMU WALL - INFILL OPENING AS INDICATED W/ NEW CMU TO MATCH THICKNESS OF EXISTING CMU. TOOTH-IN NEW CMU TO MATCH EXISTING
- NEW 3-5/8" - 25 GA. STEEL STUDS @ 16" O.C. W/ 5/8" FIBER REINFORCED IMPACT RESISTANT DRYWALL EACH SIDE - FULL HEIGHT UP TO 2" ABOVE FINISH CEILING. (WHERE WALL IS SHOWN TO CONCEAL EXISTING COLUMN INSTALL GYPSUM DRYWALL ON EXPOSED SIDE ONLY)
- SAME AS ABOVE, EXCEPT INCLUDE 3-1/2" SOUND ATTENUATION FIBERGLASS BATT INSULATION FULL HEIGHT AND EXTEND 2'-0" ON CEILING, EACH SIDE OF WALL

NOTES: CONTRACTOR TO INSTALL ACOUSTICAL SEALANT ALONG BOTTOM OF WALL, TOP OF WALL, AND AT ALL PENETRATIONS FOR WALLS INDICATED TO BE ACOUSTICALLY INSULATED.



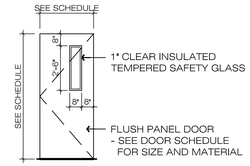
DOOR TYPE 'D'

SCALE: 1/8" = 1'-0"



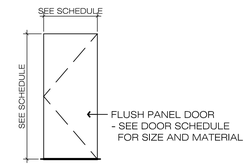
DOOR TYPE 'C'

SCALE: 1/8" = 1'-0"



DOOR TYPE 'B'

SCALE: 1/8" = 1'-0"



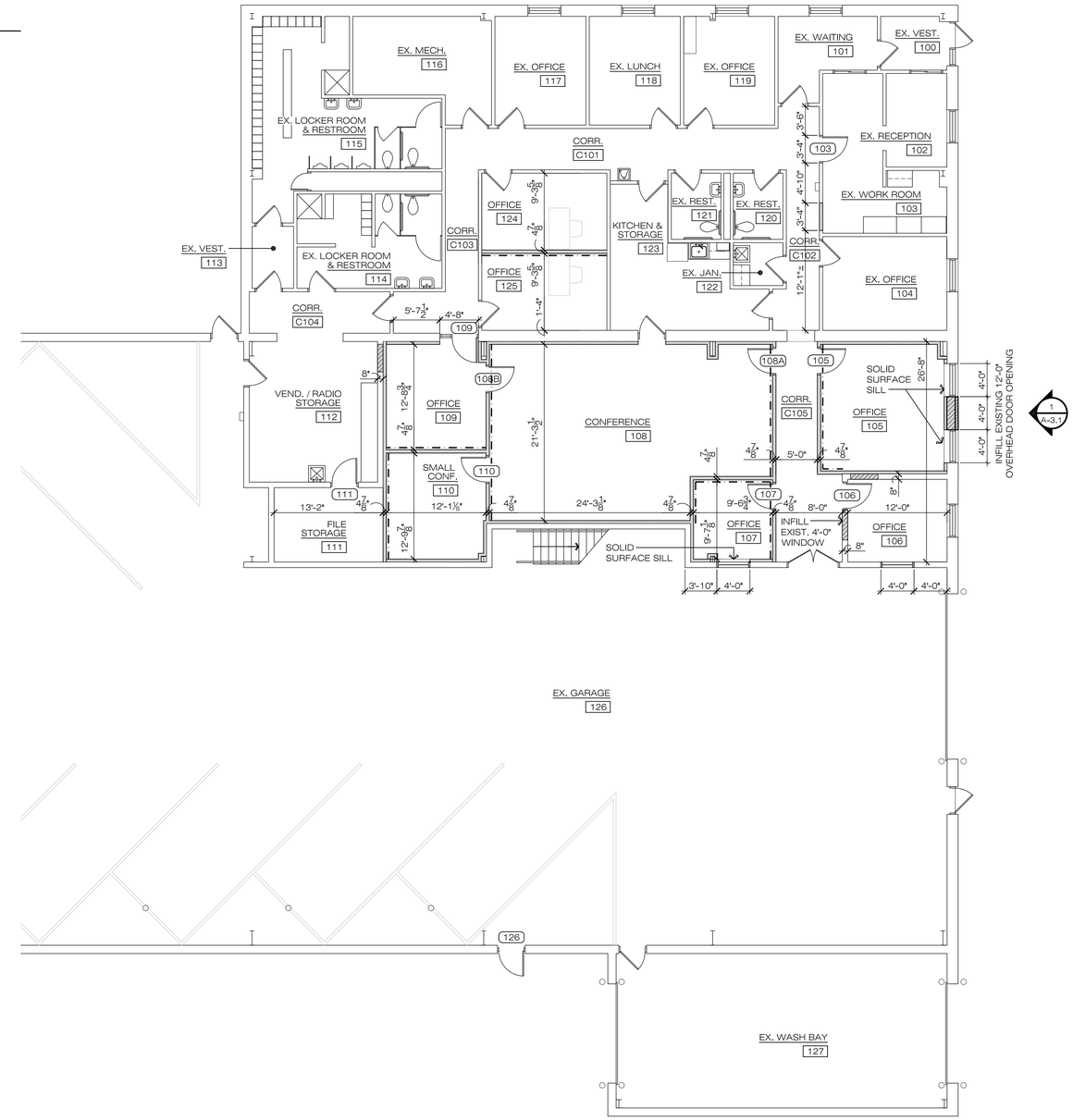
DOOR TYPE 'A'

SCALE: 1/8" = 1'-0"

DOOR SCHEDULE

DOOR NO.	DOOR W	DOOR H	DOOR T	DOOR TYPE	DOOR MAT'L	DOOR CONSTR	FRAME MAT'L	FRAME JAMB	FRAME HEAD	FRAME TYPE	HARDWARE TYPE	U.L. LABEL	NOTES
EXISTING BUILDING													
103	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
105	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
106	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	4"				1,2,3
107	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
108A	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
108B	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
109	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
110	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	2"				1,2,3
111	3'-0"	7'-0"	1'-3/4"	A	WOOD	S.C.	STEEL	2"	4"				1,2,3
126	3'-0"	7'-0"	1'-3/4"	A	STEEL	H.M.	STEEL	2"	4"				1,2,3,4
NEW ADDITION													
A101A	3'-0"	7'-0"	1'-3/4"	B	STEEL	H.M.	STEEL	2"	4"				1,2,3,4
A101B	20'-0"	14'-0"	2"	D	STEEL	INSUL	STEEL	-	-				-
A101C	20'-0"	14'-0"	2"	D	STEEL	INSUL	STEEL	-	-				-
A101D	3'-0"	7'-0"	1'-3/4"	B	STEEL	H.M.	STEEL	2"	4"				1,2,3,4
A101E	3'-0"	7'-0"	1'-3/4"	B	STEEL	H.M.	STEEL	2"	4"				1,2,3,4
A101F	20'-0"	14'-0"	2"	D	STEEL	INSUL	STEEL	-	-				-
A101G	20'-0"	14'-0"	2"	D	STEEL	INSUL	STEEL	-	-				-
A102A	3'-0"	7'-0"	1'-3/4"	C	STEEL	H.M.	STEEL	2"	4"				1,2,3,4, PAIR
A102B	3'-0"	7'-0"	1'-3/4"	B	STEEL	H.M.	STEEL	2"	4"				1,2,3,4
A102C	12'-0"	10'-0"	2"	D	STEEL	INSUL	STEEL	-	-				1,2,3,5
A102D	3'-0"	7'-0"	1'-3/4"	C	STEEL	H.M.	STEEL	2"	4"				1,2,3,4, PAIR
A103	3'-0"	7'-0"	1'-3/4"	A	STEEL	H.M.	STEEL	2"	4"				1,2,3
A104	3'-0"	7'-0"	1'-3/4"	A	STEEL	H.M.	STEEL	2"	4"				1,2,3
A105	3'-0"	7'-0"	1'-3/4"	B	STEEL	H.M.	STEEL	2"	4"				1,2,3,4

NOTES:
1. ALL DOOR HARDWARE SHALL COMPLY WITH THE OBC CHAPTER 11 AND ICC A117.1 - 2009 EDITION.
2. DOOR HARDWARE SHALL BE STANDARD COMMERCIAL GRADE HARDWARE.
3. DOOR SHALL BE EQUIPPED WITH (3) MEDIUM DUTY HINGES UNLESS OTHERWISE NOTED
4. CLOSER
5. RELOCATED SECTIONAL O.H. DOOR & OPERATOR



ENLARGED FLOOR PLAN A

SCALE: 1/8" = 1'-0"

REVISIONS:

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND ADMINISTRATION OFFICES RENOVATION
2901 REGENT AVENUE NE
CANTON, OHIO 44705

STATE OF OHIO
R.W.MEADOWS 6781
REGISTERED ARCHITECT
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
ENLARGED FLOOR PLAN

COMM 17186
DATE 02-24-2022

DWG
A-2.2

ISSUED FOR BID

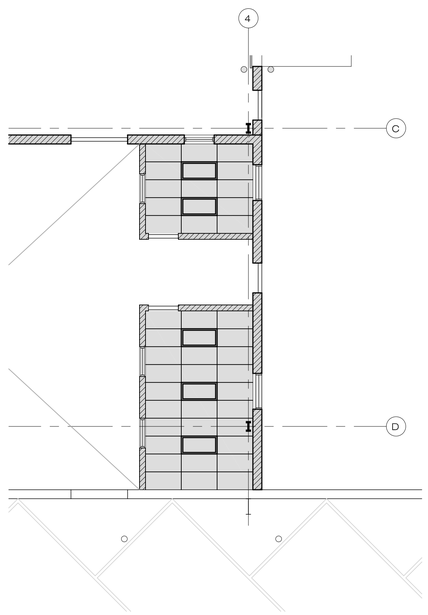
REVISIONS:

WALL TYPE LEGEND

- EXISTING WALL TO REMAIN
- NEW 1'-0" C.M.U. EXTERIOR WALL CONSTRUCTION TO MATCH EXISTING -SEE WALL SECTION(S)
- NEW 8" C.M.U. INTERIOR WALL CONSTRUCTION

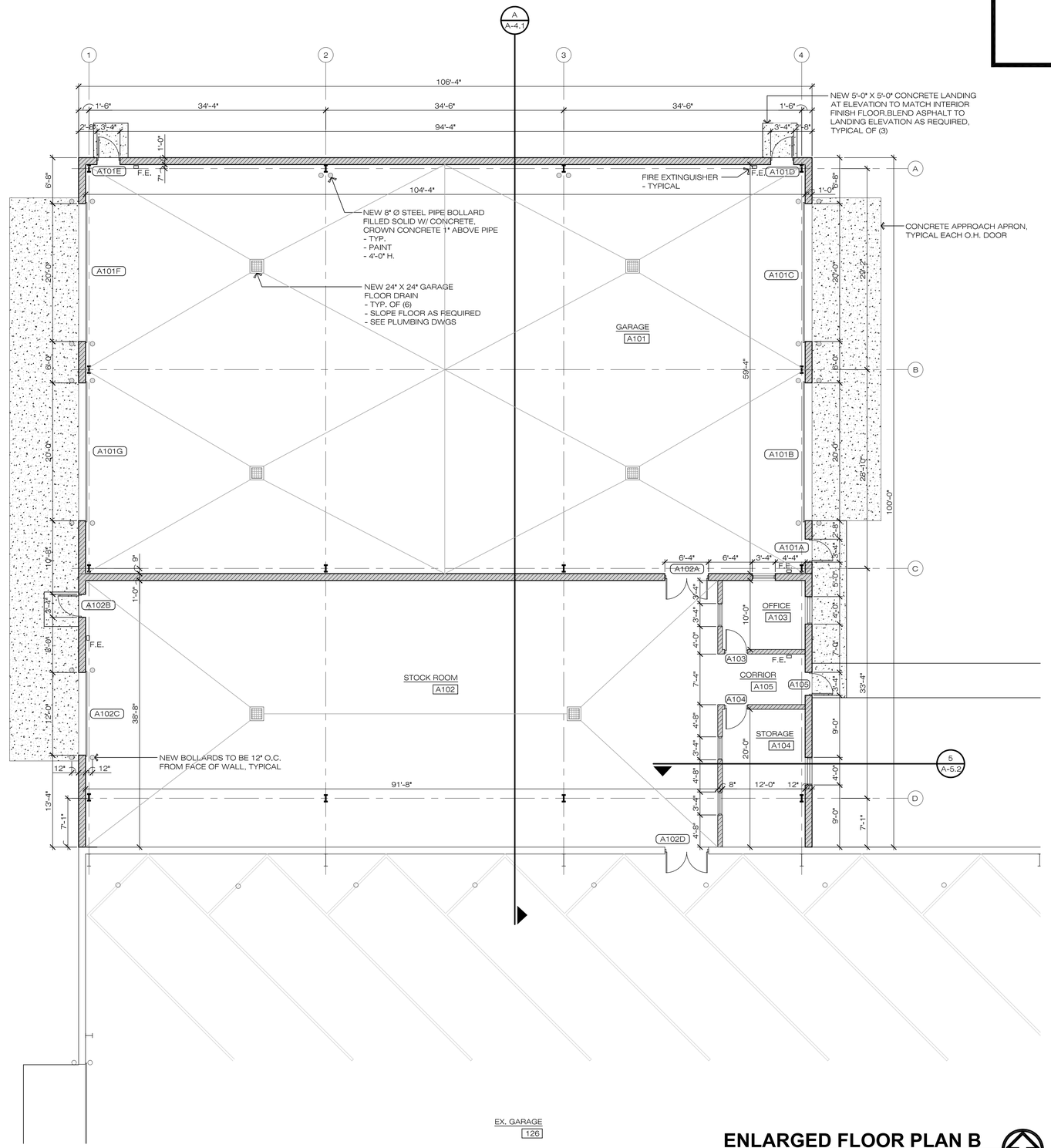
REFLECTED CEILING PLAN LEGEND

- EXISTING 2x4 SUSPENDED CEILING SYSTEM
- NEW 2x4 SUSPENDED CEILING SYSTEM
- NEW 2X4 LAY-IN RECESSED LIGHT FIXTURE
- SUPPLY AIR DIFFUSER
- RETURN AIR GRILL
- GYPSUM DRYWALL BULKHEAD



REFLECTED CEILING PLAN
ENLARGED PARTIAL FLOOR PLAN B

SCALE: 1/8" = 1'-0"



ENLARGED FLOOR PLAN B

SCALE: 1/8" = 1'-0"

MOTTER MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
GARAGE ADDITION AND ADMINISTRATION OFFICES RENOVATION
2901 REGENT AVENUE NE
CANTON, OHIO 44705

STATE OF OHIO
R.W.MEADOWS 6781
REGISTERED ARCHITECT
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
ENLARGED FLOOR PLAN

COMM 17186
DATE 02-24-2022

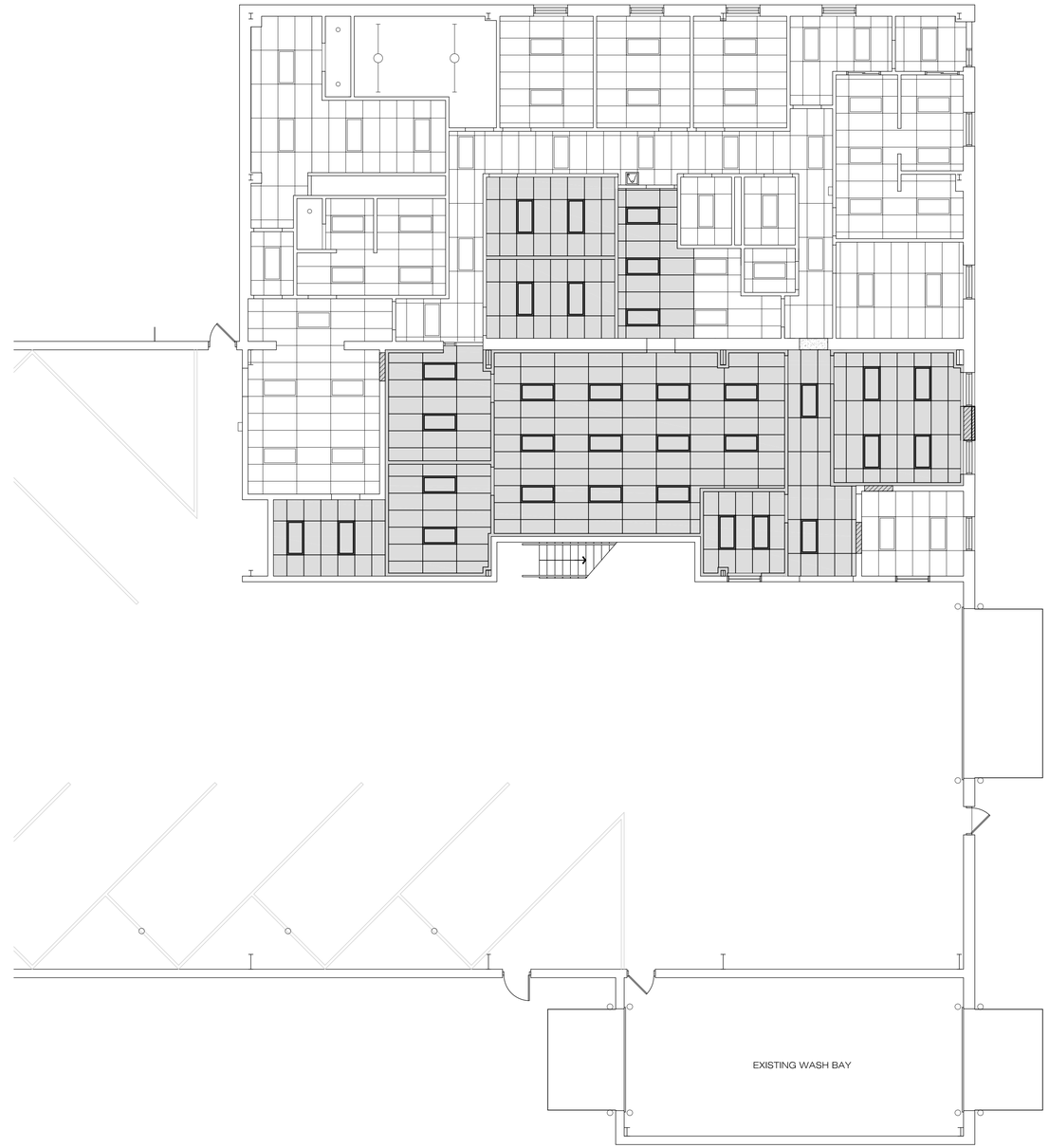
DWG
A-2.3

ISSUED FOR BID

REVISIONS:

REFLECTED CEILING PLAN LEGEND

- EXISTING 2x4 SUSPENDED CEILING SYSTEM
- NEW 2x4 SUSPENDED CEILING SYSTEM
- NEW 2X4 LAY-IN RECESSED LIGHT FIXTURE
- SUPPLY AIR DIFFUSER
- RETURN AIR GRILL
- GYPSUM DRYWALL BULKHEAD



REFLECTED CEILING PLAN
ENLARGED FLOOR PLAN A

SCALE: 1/8" = 1'-0"

N

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

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THIS DWG :
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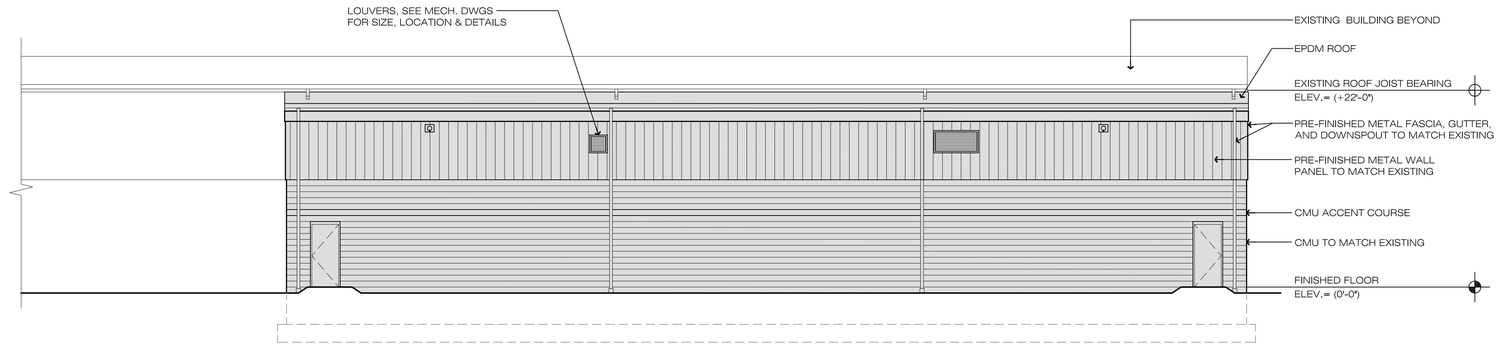
COMM 17186
DATE 02-24-2022

DWG
A-2.4

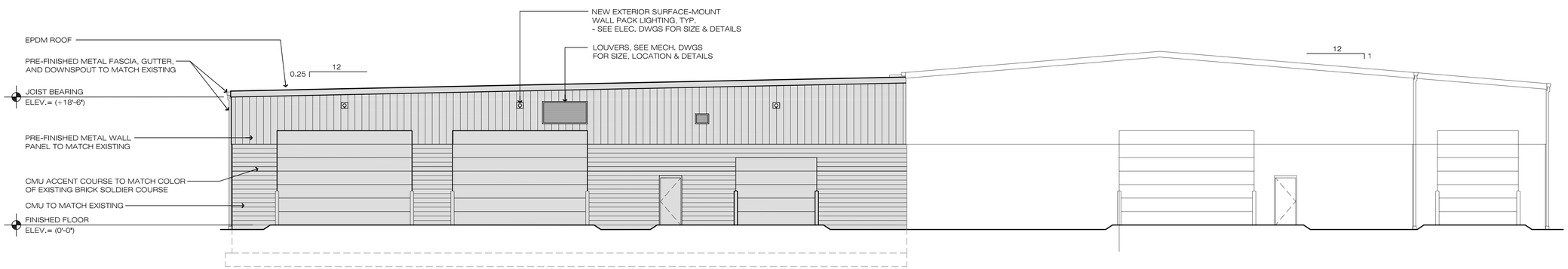
ISSUED FOR BID

REVISIONS:



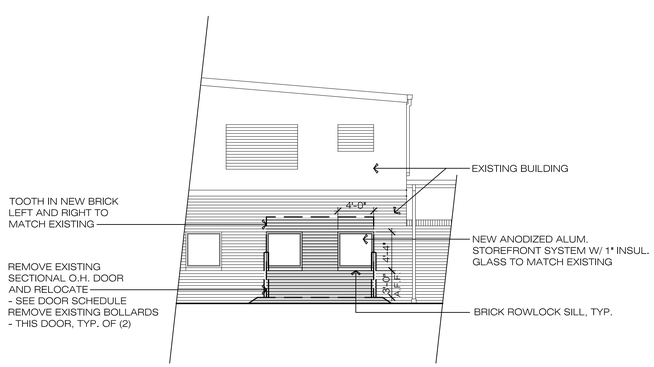
NORTH ELEVATION

SCALE: 1/8" = 1'-0"



WEST ELEVATION

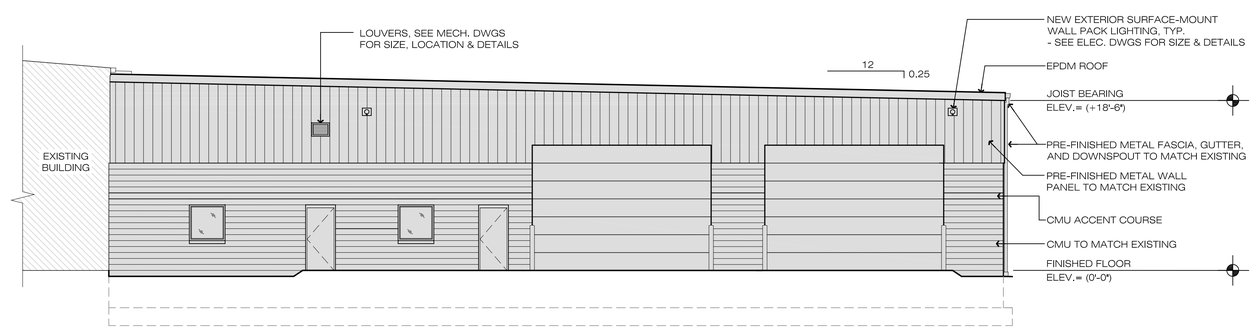
SCALE: 1/8" = 1'-0"



EXISTING EAST ELEVATION DETAIL

1
A-3.1

SCALE: 1/8" = 1'-0"



EAST ELEVATION

SCALE: 1/8" = 1'-0"

ISSUED FOR BID

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ARCHITECTS

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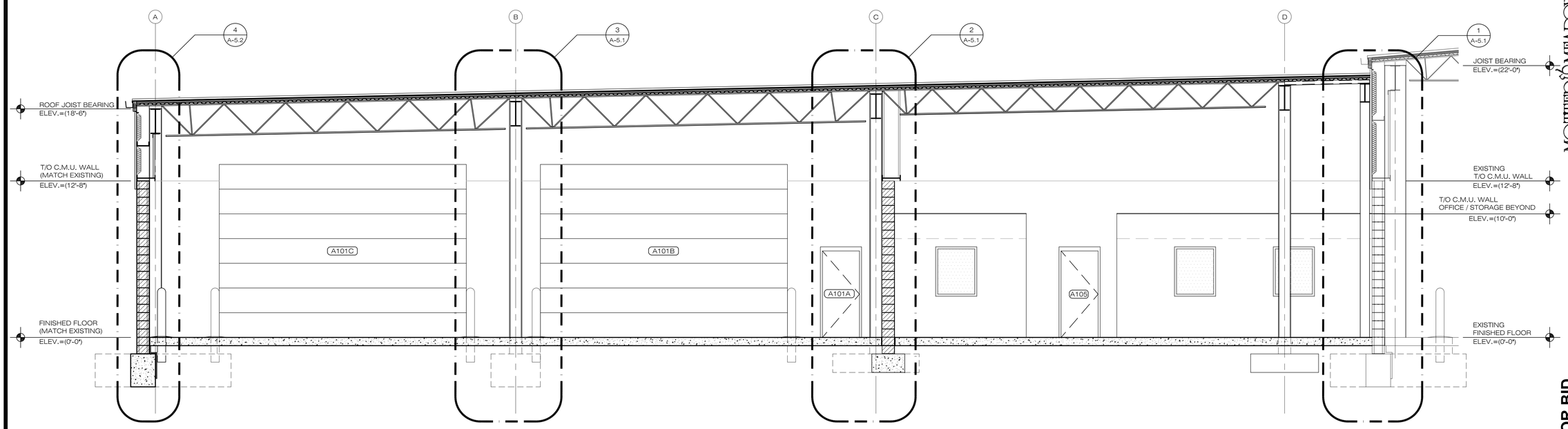
THIS DWG :
EXTERIOR ELEVATIONS

COMM 17186
DATE 02-24-2022

DWG
A-3.1



BUILDING SECTION

SCALE: 1/4" = 1'-0"

A
A-4.1

REVISIONS:

MOTTER & MEADOWS
ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

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BUILDING SECTION

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DWG
A-4.1

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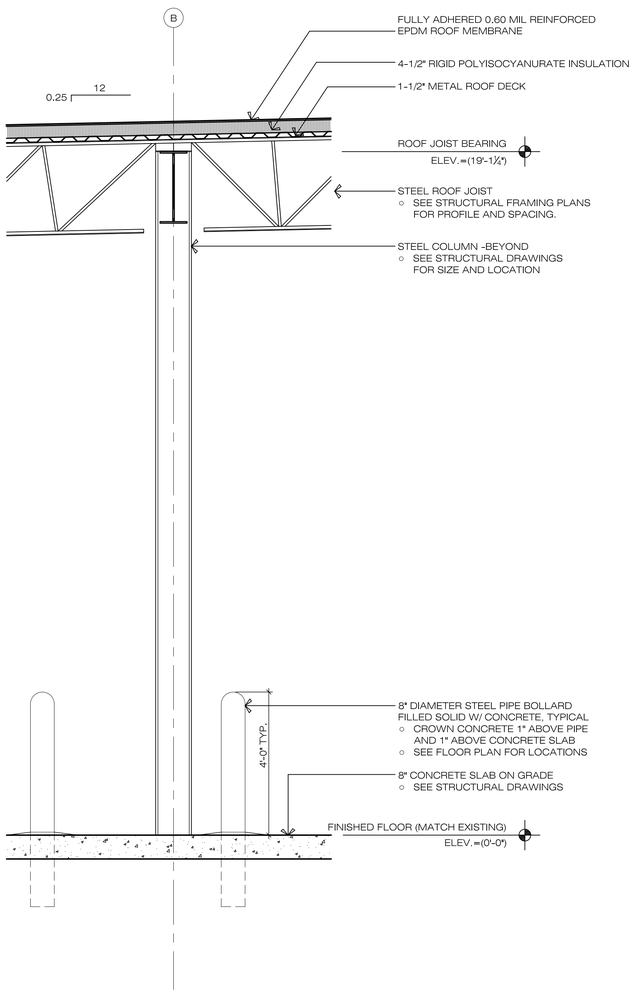
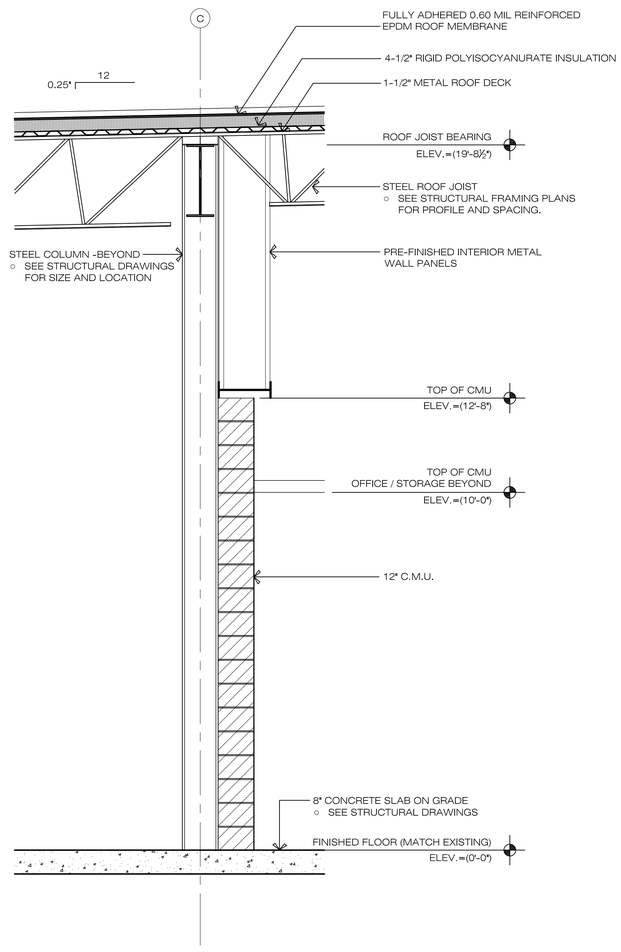


WALL SECTION

SCALE: 1/2" = 1'-0"

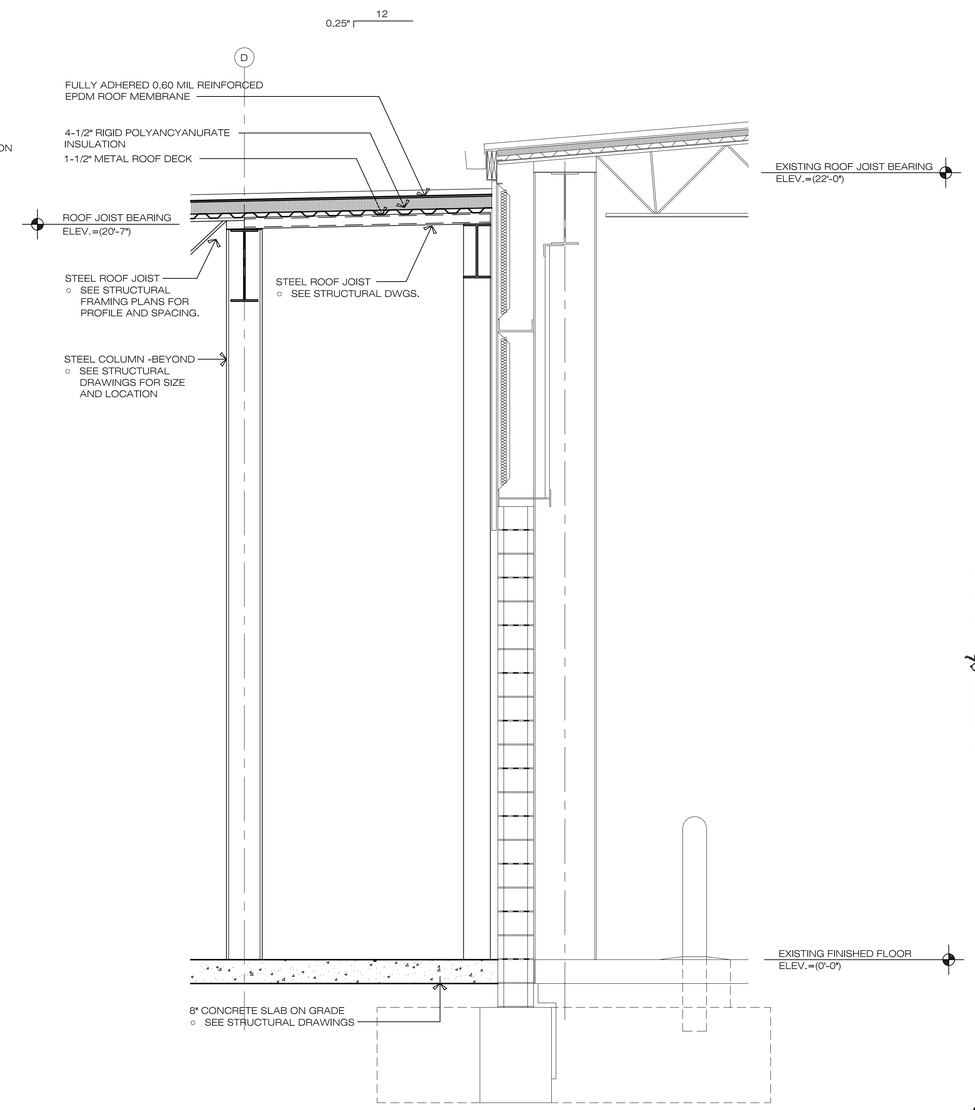
3 / A-5.1



WALL SECTION

SCALE: 1/2" = 1'-0"

2 / A-5.1



WALL SECTION

SCALE: 1/2" = 1'-0"

1 / A-5.1

REVISIONS:

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

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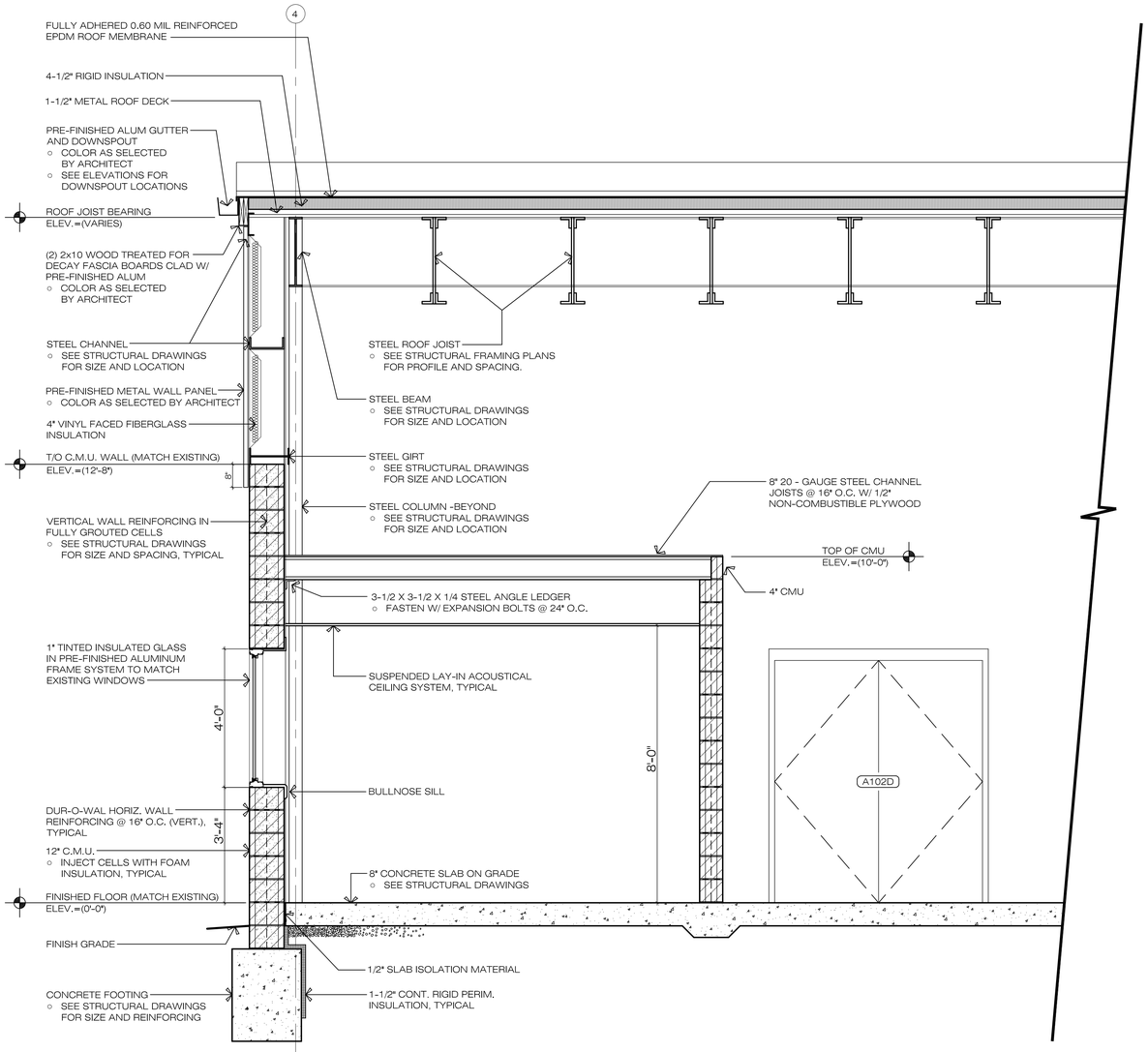
DWG
A-5.1

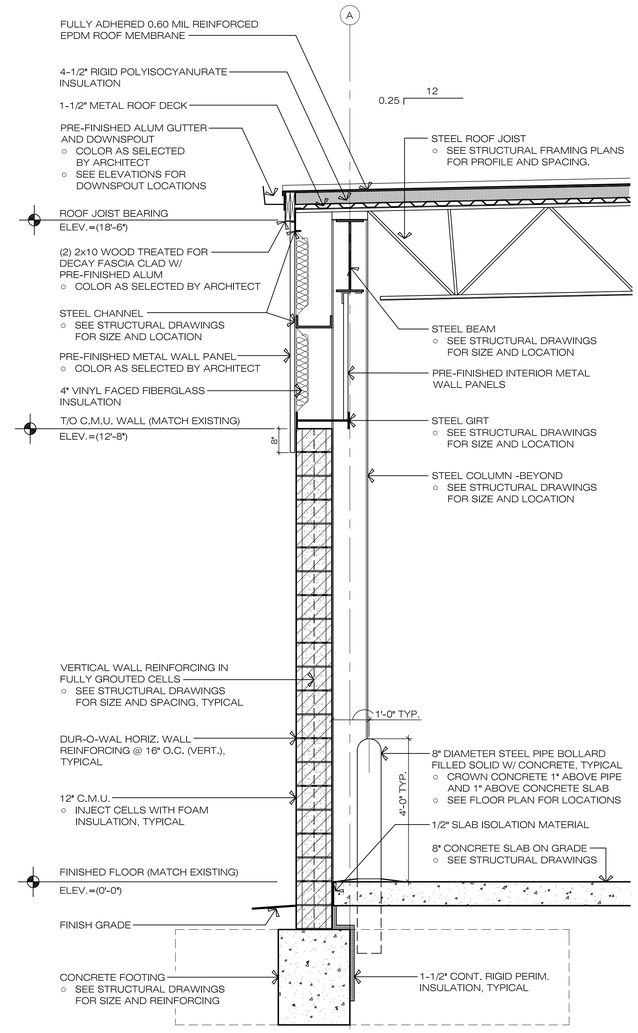
ISSUED FOR BID



WALL SECTION

SCALE: 1/2" = 1'-0"

5
A-5.2



WALL SECTION

SCALE: 1/2" = 1'-0"

4
A-5.2

REVISIONS:

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER
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WALL SECTIONS

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DWG
A-5.2

ISSUED FOR BID

CODES AND STANDARDS

1. New construction has been designed to, and shall be constructed in accordance with the following building codes and standards:
   A. 2017 Ohio Building Code (OBC 2017)
   B. ASCE 7-10, Minimum Design Loads for Buildings and Other Structures
2. Unless explicitly modified in the Contract Drawings and Specifications, the Contractor shall comply with provisions of:
   A. ACI 301-10, Specifications for Structural Concrete
   B. ACI 318-14, Building Code Requirements for Structural Concrete
   C. ACI 530-13, Building Code Requirements for Masonry Structures
   D. ACI 530.1-13, Specification for Masonry Structures
   E. AISC 341-10, Seismic Provisions for Structural Steel Buildings
   F. AISC 360-10, Specification for Structural Steel Buildings
   G. AWS D1.1-10, Structural Welding Code - Steel
   H. SDI RD1.0-10, Standard for Steel Roof Deck
   I. SJI JG-10, Standard Specification for Joist Girders
   J. SJI K-10, Standard Specification for Open Web Steel Joists, K-series
   K. SJI LH/DLH-10, Standard Specification for Longspan Steel Joists, LH-series and Deep Longspan Steel Joists, DLH-series

DESIGN LOADS (OBC 2017)

Floor live load

Slab-On-Grade ---------- 200 psf

Roof live load

Roof live load ---------- 20 psf

Roof snow load data

Ground snow load (ASCE 7, Figure 7-1) ---------- P_g = 20 psf
Flat-roof snow load (ASCE 7, 7.3) ---------- P_f = 20
Snow exposure factor (ASCE 7, Table 7-2) ---------- C_e = 1.0
Snow importance factor (ASCE 7, Table 1.5-2) ---------- I_s = 1.0
Thermal factor (ASCE 7, Table 7-3) ---------- C_t = 1.0

Wind design data

Ultimate design wind speed (ASCE 7, Figure 26.5-1) ---------- V_{ult} = 115 mph
Nominal design wind speed (OBC 1609.3.1) ---------- V_{asd} = 90 mph
Risk category (ASCE 7, Table 1.5-1) ---------- II
Exposure category (ASCE 7, 26.7.3) ---------- B
Internal pressure coefficient (ASCE 7, Table 26.11-1) ---------- GC_{pi} = ±0.18
Components and cladding (Ultimate)
Effective Wind Area ---------- 10 ft^2 (1)
Zone 1 (Roof Interior) ---------- +16.0, -23.8 psf
Zone 2 (Roof Edge) ---------- +16.0, -39.9 psf
Zone 3 (Roof Corner) ---------- +16.0, -60.1 psf
Zone 4 (Wall Interior) ---------- +23.8, -25.8 psf
Zone 5 (Wall Corner) ---------- +23.8, -31.9 psf

(+) Indicates pressure acting toward the surface
(-) Indicates pressure acting away from the surface
Edge and corner zones are defined as areas within 8'-2" of edge or corners

(1) Components and cladding engineer may calculate wind loads based on actual effective wind area per ASCE 7

Earthquake design data

Risk category (ASCE 7, Table 1.5-1) ---------- II
Seismic importance factor (ASCE 7, Table 1.5-2) ---------- I_e = 1.0
Mapped spectral response acceleration parameters
Short period ---------- S_s = 0.133 g
1-second period ---------- S_1 = 0.055 g
Site class (presumed) ---------- D
Design spectral response acceleration parameters
Short period ---------- S_{ds} = 0.142 g
1-second period ---------- S_{d1} = 0.088 g
Seismic design category ---------- B
Basic seismic-force-resisting system (ASCE 7, Table 12.2-1)
Moment-Resisting Frame Systems
Steel Ordinary Moment Frames
Design base shear (ASCE 7, 12.8.1) ---------- V = 41 Kips
Seismic response coefficient (ASCE 7, 12.8.1.1) ---------- C_s = 0.041
Response modification factor (ASCE 7, Table 12.2-1) ---------- R = 3.5
Analysis procedure ---------- Equivalent lateral force procedure

DESIGN STRESSES

Concrete minimum compressive strength in 28 days:
Footings ---------- f'_c = 3,000 psi
Interior slabs on grade ---------- f'_c = 4,000 psi
Structural concrete subject to freezing and thawing ---------- f'_c = 5,000 psi
Lean concrete, for use with overexcavations ---------- f'_c = 1,500 psi
Reinforcing bars (ASTM A615, Grade 60) ---------- F_y = 60,000 psi
Welded wire reinforcement (ASTM A1064) ---------- F_y = 70,000 psi
Structural steel W, WT and S shapes (ASTM A992 or ASTM A572/50) -------- F_y = 50,000 psi
Structural steel other shapes (ASTM A36) ---------- F_y = 36,000 psi
Anchor rods (ASTM F1554, Grade 55, weldable) ---------- F_y = 55,000 psi
Metal decks (ASTM A653)
Roof deck ---------- F_y = 33,000 psi
Hollow structural sections (ASTM A500, Grade C)
Rectangular ---------- F_y = 50,000 psi
Round ---------- F_y = 46,000 psi
Masonry ---------- f'_m = 2,000 psi
Load-bearing CMU (ASTM C55 or C90)
Brick (ASTM C216 Grade SW)
Mortar (ASTM C270) ---------- Type M or S
Grout (ASTM C476) ---------- 3,000 psi
Soil bearing pressure for foundations
bearing strata ---------- 2,000 psf

GENERAL

1. All new construction shall comply with the Contract Documents and the Building Code.
2. Typical details and general notes apply to all parts of the work except where specifically detailed or unless otherwise noted.
3. The structural drawings illustrate structural members. Refer to architectural, mechanical, and electrical drawings for non-structural items which require special provisions during the construction of the structural members.
4. Drawings are not to be scaled.
5. Refer to architectural plans for floor depressions, openings, slopes, drains, curbs, pads, embedded items, non-bearing partitions, etc. Refer to mechanical and electrical plans for sleeves, openings, and hangers for pipes, ducts, and equipment.
6. No pipes or ducts shall be embedded into structural members unless so shown on the plans or approved by the Engineer.
7. The Contractor shall verify and be responsible for all dimensions and conditions which impact the work. Field verify sizes, elevations, hole locations, etc., prior to fabrication.
8. The Contractor shall carefully review the drawings to identify the scope of work required, visit the site to relate the scope of work to existing conditions and determine the extent to which those conditions and physical surroundings will impact the work.
9. Existing conditions as shown on these plans are for reference only. The Contractor is required to field verify all existing conditions prior to construction.
10. Locate existing underground utilities in areas of construction. Coordinate with utility companies for any shut-off requirements of still active lines.
11. The Contractor shall resolve any conflicts on the drawings or in the specifications with the Architect/Engineer before proceeding with the work.
12. Any deviation, modification, or substitution from the approved set of structural drawings shall be submitted to the Owner, Architect, and Engineer for review/approval prior to its use or inclusion on the shop drawings.
13. The Contractor shall provide all necessary shores, braces, and guys required to support all loads to which the building structure and components, soils, other structures, and utilities may be subjected during construction. Shoring systems shall be designed, signed, and sealed by a professional engineer licensed in the jurisdiction where the project is located.
14. The Contractor shall provide means, method, techniques, sequence, and procedure of construction as required.
15. The Contractor shall protect all work, materials, and equipment from damage and shall provide proper storage facilities for materials and equipment during construction.
16. Site visits performed by the Architect/Engineer do not constitute inspections of means and methods of construction performed by the Contractor.
17. Structural observations performed by the Architect/Engineer during construction are not the continuous and special inspection services and do not waive the responsibility for the inspections required of the Building Department Inspector or the testing agency. Observations also do not guarantee the Contractor's performance and shall not be considered as supervision of construction.
18. The Contractor shall review shop drawings for completeness and compliance with contract documents. The Contractor shall stamp shop drawings prior to submission to the Architect and Engineer.
19. Review of the shop drawings by the Architect's Engineers shall not be construed as an authorization to deviate from the Contract Documents.
20. Shop drawings will not be processed if they are incomplete, lack coordination with relevant portion of contract documents, lack calculations if required, or if deviations, modifications, and substitutions are indicated without prior written approval from the Architect/Engineer.

FOUNDATIONS AND SLABS ON GROUND

1. Foundations for this project are designed in accordance with the recommendations made for the original building by Timmerman Geotechnical Engineer Group, Inc. All the work regarding site preparation, earth fill construction, backfill requirements, foundation preparations, etc., shall be in strict conformance to the requirements and recommendations of the Geotechnical Engineer's report.
2. Elevations given are to bottom of footings.
3. Slab elevations given are to top of structural slab. See Architect's drawings for layout of ramps and steps.
4. All footings must be supported on undisturbed soil capable of achieving the design soil bearing pressure without appreciable settlement. Where additional excavation is required to attain the design bearing pressure, backfill the overexcavated area with lean concrete up to the design bearing elevation.
5. Provide (2) #5 minimum continuous in all footings directly under masonry walls.
6. Unless otherwise noted in the geotechnical report or specifications, compact all fill under slabs on ground to 98% of optimum laboratory density in accordance with ASTM D698 Standard Proctor Method. Place fill in 6" to 8" layers and compact with vibratory tamping equipment.
7. Unless otherwise noted in the geotechnical report or specifications, compact all engineered fills under foundations to 95% of the maximum dry density per ASTM D1557 Modified Proctor Method.
8. In granular soils (sands and gravel) the soil shall be mechanically tamped to a hard surface immediately prior to placing footing.
9. Existing foundations:
   A. Existing foundations shown on drawings are approximate. Exact conditions must be verified at time of construction.
   B. When new footings meet existing footings, they shall be stepped at a ratio of 2 horizontal to 1 vertical.
   C. Unless otherwise noted, new footings shall not bear below existing footings.
10. Before backfill, all walls must be adequately braced. For backfill requirements, see specifications and/or geotechnical report.
11. Bearing into shale: elevations given are approximate and shall be adjusted to suit field conditions.
12. When excavations approach the ground water level, the water level shall be lowered by an acceptable dewatering system so that the water level is maintained continuously a minimum of 2'-0" below the excavation.
13. The bottom of foundations shall be protected against freezing until backfill or other permanent protective cover is in place.

CONCRETE CONSTRUCTION

1. All concrete construction shall be in accordance with the latest Building Code Requirements for Structural Concrete ACI 318 and ACI Detailing Manual, except that construction and removal of forms and reshoring shall be inspected by the Contractor's engineer.
2. Reinforcing steel shall have the following minimum coverage. Place bars as near to the concrete surface as these minima permit wherever possible, unless noted otherwise:
   A. Concrete poured against earth: 3"
   B. Formed concrete in contact with earth: 2"
   C. Exterior face of walls: 2"
   D. All other wall faces and slabs: 3/4" (#11 and smaller), 1 1/2" (#14 and #18)
3. Welded wire reinforcement for slabs on ground shall have a minimum top coverage of 1" and a maximum top coverage of 1 1/2", unless otherwise noted. Reinforcement shall be positively supported and maintained in this position during placement of concrete.
4. Furnish bar supports where necessary during construction.
5. Provide plastic-coated (not plastic-tipped) or stainless steel chairs in all concrete exposed to view in completed structure.
6. Provide pipe sleeves and inserts in concrete work where required. See architectural and mechanical drawings.
7. Obtain approval of Engineer before locating sleeves, holes, or inserts in slabs within 2'-0" of face of columns or anywhere in beams, joists, or columns.
8. Unless noted otherwise, provide the following minimum reinforcing:
   A. Slabs on ground and toppings (2" minimum): 6x6-W1.4xW1.4 welded wire reinforcement in flat sheets.
9. Construction joints shall be positioned so as not to change the structural design requirements. The location and size of all construction joints shall be approved by the Engineer. Submit proposed pour layout for Engineer's review and approval two weeks prior to placing concrete.
10. Welding of reinforcing bars (including tack welding) is not permitted without permission of Engineer in writing. Where and when permitted, welded rebars shall comply with ASTM A706 (Fy=60 ksi) and welding shall conform to AWS D1.4. Welding shall be performed by certified welders.
11. Unless noted otherwise in project specifications or drawings, all exposed concrete subjected to freezing and thawing shall have a minimum cement content of 610 pounds per yard, a maximum water/cement ratio of 0.40, and 6%±1.5% of entrained air.
12. At wall and footing corners, innermost reinforcing shall have 1'-0" long hook at far face. For outer reinforcing, provide corner bars with lap length of 36 bar diameters (2'-0" minimum).
13. Provide foundation dowels for all walls same size and spacing as vertical steel.
14. All bars interrupted by structural steel shall extend to within 1" of structural steel flange or web and have a 90° hook unless otherwise shown.
15. Drawings show typical reinforcing conditions. Contractor shall prepare detailed placement drawings of all conditions showing quantity, spacing, sizes, clearances, laps, intersections, and coverage required by the structural details, applicable code, and trade standards. Contractor shall notify reinforcing inspector of any adjustments from typical conditions which are proposed in placement drawings to facilitate field placement of reinforcing steel and concrete.
16. Bar bends shall be made cold. Bars shall not be bent after any portion of the bar is encased in concrete.
17. Splices (grade 60 deformed bars):
   A. Lap all compression splices 30 bar diameters of the larger bar.
   B. Lap all tension splices in accordance with the following tables. Provide Class B Tension Lap Splices unless otherwise noted.
   C. Increase tension or compression splice lengths by the following factors. Increases are Cumulative:
      1) Epoxy-coated top bars: 1.3
      2) Epoxy-coated other bars: 1.5
      3) Lightweight concrete: 1.3
      4) Bundled bars (3 bar bundles): 1.2
      5) Bundled bars (4 bar bundles): 1.33
   D. Top bars are defined as horizontal bars with more than 12" of fresh concrete below.

Bar Size	Class B Tension Lap Splice					
	f'c = 3000 psi		f'c = 4000 psi		f'c = 5000 psi	
	Top	Other	Top	Other	Top	Other
#3	28"	22"	24"	19"	22"	17"
#4	37"	29"	33"	25"	29"	23"
#5	47"	36"	41"	31"	36"	28"
#6	56"	43"	49"	37"	43"	34"
#7	81"	63"	71"	54"	63"	49"
#8	93"	72"	81"	62"	72"	56"
#9	105"	81"	91"	70"	81"	63"
#10	118"	91"	102"	79"	92"	70"
#11	131"	101"	113"	87"	102"	78"

Bar Size	Class A Development Length, ld					
	f'c = 3000 psi		f'c = 4000 psi		f'c = 5000 psi	
	Top	Other	Top	Other	Top	Other
#3	22"	17"	19"	15"	17"	13"
#4	29"	22"	25"	19"	23"	17"
#5	36"	28"	31"	24"	28"	22"
#6	43"	33"	37"	29"	34"	26"
#7	63"	48"	54"	42"	49"	38"
#8	72"	55"	62"	48"	56"	43"
#9	81"	62"	70"	54"	63"	48"
#10	91"	70"	79"	61"	70"	54"
#11	101"	78"	87"	67"	78"	60"

MASONRY CONSTRUCTION

1. Masonry walls shown on structural drawings have been designed in accordance with ACI 530, Building Code Requirements for Masonry Structures.
2. Masonry walls shall be constructed in accordance with ACI 530.1, Specifications for Masonry Structures, and the project specifications.
3. Determine compressive strength of masonry (f'm) by the unit strength method (Section 1.4,B.2 of ACI 530.1).
   A. Mortar shall meet the Property Specifications' requirements of ASTM C270, and shall be field tested according to ASTM C780.
   B. The strength of grout shall be determined by tests in accordance with ASTM C1019.
4. Intersecting walls shall be anchored by one of the following methods (does not apply at control joints or where non-load-bearing partitions abut bearing walls):
   A. Fifty percent of the units at the intersection shall be laid in an overlapping masonry bonding pattern, with alternate units having a bearing of not less than 3" on the unit below.
   B. Walls shall be tied by galvanized steel straps 1 1/2" x 1/4" x 24" with 2" bend at 90° each end. Grout straps solid into cores of block at 24" maximum vertical spacing.
5. Corners of bearing walls shall be built in running bond.
6. Provide corner bars in bond beams at wall intersections and corners to match bond beam reinforcing.
7. Provide a minimum of 24" depth of solid masonry under the bearing ends of all beams, beam lintels, and LH Series Joists; 16" depth of solid masonry under the bearing ends of all K Series joists and slabs; and 8" of solid masonry under the bearing ends of loose lintels.
8. Unless otherwise noted, provide galvanized ladder type joint reinforcement at 16" on center vertically per ASTM A82.
9. Welding of reinforcing bars (including tack welding) is not permitted without permission of Engineer in writing.
10. Provide shop drawings which indicate size, spacing, bending details, and type of all reinforcing bars placed in masonry walls.
11. Provide dowels from supporting member (footing, beam, or slab) for all reinforced walls same size, location, and spacing as wall reinforcing.
12. Wall reinforcing shall be held in position during grouting.
13. For bars at face of wall, maintain 1/2" clearance from inside face of CMU to reinforcing.
14. Splices:
   A. Lap all splices in accordance with the following table.
   B. Increase splice length by 50% for epoxy-coated reinforcing.
   C. Splice lengths greater than 64" require high lift grouting. The Contractor, at his option, may use open-ended masonry units or mechanical splices for ease of construction.

Bar Size	Reinforcing Centered in Wall Nominal Wall Width					Reinforcing at Face of Wall
	6"	8"	10"	12"	16"	
#3	15"	15"	15"	15"	15"	15"
#4	20"	20"	20"	20"	20"	22"
#5	28"	25"	25"	25"	25"	35"
#6	53"	38"	30"	30"	30"	64"
#7		52"	40"	35"	35"	87"
#8		79"	61"	50"	40"	131"
#9			78"	64"	46"	166"

LOOSE LINTEL SCHEDULE

1. Interior lintels shall be shop painted. Lintels exposed to weather shall be 3/8" minimum thickness and hot-dip galvanized.
2. Bottom plates in beam/plate assemblies shall be 1/2" less in width than the supported masonry wall. Stop end of bottom plates 1/2" from edge of opening.
3. Weld bottom plates to lintels with continuous fillet welds (exterior side).
4. Steel lintels and lintel plates in exterior walls shall be fabricated, followed by hot-dip galvanizing of the complete assembly.
5. Lintels shall have minimum bearing at each end of 1" per foot of opening (6" minimum) except as detailed.
6. Lintels shall have 8" minimum solid masonry below bearing points and shall extend beyond the full bearing area.
7. Lintel bearing plates shall be held back 1/2" minimum from face of masonry at opening. Provide flexible caulk between lintel and masonry at this location. Match mortar color.
8. The following schedules apply to all non-bearing masonry walls and to bearing walls where lintels are not indicated on the structural drawings. See drawings for other lintels in bearing walls.
   A. For 4", 8", 12", and 16" walls, provide one angle for each 4" of masonry wall thickness with 3 1/2" leg horizontal as follows:

Span Limits	Angle Size
0'-0" to 4'-0"	L3 x 3 1/2 x 1/4
4'-1" to 5'-6"	L4 x 3 1/2 x 5/16
5'-7" to 7'-6"	L5 x 3 1/2 x 5/16
7'-7" to 9'-6"	L6 x 3 1/2 x 3/8

STRUCTURAL STEEL WELDING

1. All welding shall be in strict conformance with the latest building code and AWS D1.1.
2. The Contractor shall provide welding procedure specification (WPS) and detailed sequence of welding sketch for review and approval prior to starting of fabrication. The sequence of welding shall be planned to minimize locked-in stresses and distortion.
3. All welding electrodes (filler metal) shall be E70XX (70 ksi), unless otherwise noted.
4. Complete penetration groove welds shall have filler metal with Charpy V-notch toughness of 20 ft.-lbs. average at 40° F.
5. Certify conformance to Charpy V-notch toughness requirements with tests by an independent testing laboratory for each AWS classification, manufacturer, and trade name. The sizes as specified by AWS shall be tested.
6. Lengths of welds are effective lengths. Where length of weld is not shown, it shall be full length of joint. All butt welds shall be full penetration unless otherwise noted.
7. Welders shall be qualified and certified for the work they will be performing and shall have current certifications.
8. Faces of fillet welds exposed to view shall have as-welded surfaces that are reasonably smooth and uniform. No finishing or grinding shall be required, except where clearances or fit of other items may so necessitate.
9. All partial and full penetration welds which are exposed to view shall be ground smooth and flush with finish surface of steel. Holes shall be filled with weld metal or body solder and smoothed by grinding or filing.
10. Clean groove preparation thermal cuts by grinding.
11. Welds shall be terminated at the end of a joint in a manner that will ensure sound welds. Whenever necessary, this shall be done by the use of extension bars and run-off tabs.
12. To assure the proper amperage and voltage of the welding process, a hand-held calibrated amp and volt meter shall be used. This equipment shall be used by the fabricator, erector, and inspectors. Amperage and voltage shall be measured at the arc with this equipment. Travel speed and electrode stick out shall be verified to be in compliance with the electrode manufacturer's recommendations and with the approved WPS.

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MOTTER MEADOWS ARCHITECT

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6781
REGISTERED ARCHITECT
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
GENERAL NOTES

COMM 17186
DATE 02-24-2022

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STEEL CONSTRUCTION

1. Steel detailing, fabrication, and erection shall conform to the AISC Specification for Structural Steel Buildings and Code of Standard Practice, and the AWS Structural Welding Code.
2. Stresses occurring during fabrication, shipment, and erection shall be temporary and not excessive. Stresses at all times shall be less than design and allowable stresses. The full design and load-carrying capacity of the steel work shall not be impaired due to fabrication, shipment, or erection procedures. Throughout the complete process, the stability of all individual members and assemblies shall be maintained.
3. The Contractor shall be responsible for the control of all erection procedures and sequences with relation to temperature differentials and weld shrinkage.
4. All additional steel required for erection purposes shall be provided at no additional cost and shall be removed unless approved by the Owner in writing.
5. Connections - welded or high strength bolted:
   - A. Bolts shall be ASTM F3125 and shall be installed in accordance with "Specifications for Structural Joints Using High-Strength Bolts".
   - B. Provide slip critical bolts for all moment connections, wind connections, hangers, and other connections as noted on drawings.
   - C. Provide bearing type connections with thread included in the shear plane for all connections other than slip critical connections.
   - D. Provide hardened washers under nuts at all high-strength bolts, except where plate washers are used per AISC Specifications.
   - E. Unless snug tight connections are noted on the drawings as being permitted, all bolts should be tightened to full pretensioning load.
   - F. Use standard holes with the following exceptions: oversize holes are permitted when bolts are loaded in tension; short slotted holes are permitted for shear loading perpendicular to the slot.
   - G. Provide beveled washers on all connections to sloping flanges of I sections and channels where slope exceeds 1:20.
   - H. Where minimum AISC fillet weld thickness requirement exceeds welds shown on details, or weld size is not specified, provide minimum AISC weld.
   - I. The length of connection shall not be less than one-half of the T distance of the beam web.
   - J. Where reaction is noted, develop same. Where not noted, for non-composite beams, connections shall develop one-half of the total uniform load capacity of the beam; for composite beams, see table listed in typical details.
6. Welding electrodes shall be E70XX except where other electrodes are required for compatibility with material being welded.
7. All slip connections shall be provided with a means of preventing the nuts from unthreading.
8. Shop drawings are required and shall note type of electrodes, size of all welds, and type and size of all bolts. Shop drawings shall be prepared under the supervision of a professional engineer licensed in the jurisdiction where the project is located.
9. Primer, unless otherwise noted:
   - A. Clean surfaces to remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards: SSPC-SP 2, "Hand Tool Cleaning" for all steel.
   - B. Do not paint beams that are encased in concrete or that are to receive sprayed-on fireproofing.
   - C. Omit paint at slip critical connections and areas to be welded.
   - D. Interior steel: Provide chemically active, modified alkyd primer at 2.5 mils dry thickness.
   - E. Exterior steel: Provide fast-curing, two-component, moisture-cured, zinc-rich urethane primer for exterior steel at 3.0 mils dry thickness.
   - F. Galvanized steel: Provide where noted.
10. Beams bearing on masonry shall have angle wall anchors and bear a minimum of 8" onto the wall. Masonry shall be built tightly around beam unless otherwise noted.
11. Beams (16" or greater in depth) and columns that are encased in masonry shall have adjustable masonry anchors spaced at 2'-0" on center.
12. See all contract drawings for miscellaneous steel requirements.
13. All shop and field welding shall be performed by a recently certified welder.
14. All welding and high strength bolting must be inspected by a qualified testing laboratory. Laboratory shall be approved by the Architect and/or Engineer.
15. At column base plates, provide a minimum of 1" grout with (4) 3/4" diameter anchor bolts with 1'-0" embedment.
16. At roof beam bearing plates, provide a minimum of 3/4" grout with (2) 3/4" diameter anchor bolts with 1'-0" embedment.
17. Do not weld to existing steel without written approval from the Engineer.
18. Provide fills at splices of parts differing by more than 1/8" in thickness.
19. Provide 1/4" closure plates at all open ends of HSS members.
20. Miscellaneous hanging loads such as stair stringers, pipes, mechanical units, etc., supported by steel members shall be applied in such a manner that no torsional forces are induced in the steel members, i.e., loads shall pass through the centerline of wide flange sections and through the shear center of channels.

STEEL JOIST CONSTRUCTION

1. Steel joist construction shall conform to the Standard Specifications and Code of Standard Practice for Steel Joists and Joist Girders of the Steel Joist Institute, latest edition.
2. Provide steel joist end anchorage, bridging, and bridging anchorage in accordance with Standard Specifications of the Steel Joist Institute, latest edition. Weld steel joist bearing ends to steel supports or bearing plates.
3. When horizontal bridging is used at the top and bottom chords of steel joists, provide additional angle x-bridging as follows:
   - A. For bridging attached to masonry walls, provide additional angle x-bridging between the second, third, and fourth joists from exterior walls (second and third joist spaces).
   - B. For bridging attached to steel beams, provide additional angle x-bridging between the first, second, and third joists from spandrel beams (first and second joist spaces).
4. Provide header angles and double joists as required for openings. See structural and mechanical drawings.
5. Provide sloped end bearing where required.
6. In addition to the horizontal bridging required by the Steel Joist Institute for roof joists, provide a single line of bottom chord bridging near the first bottom chord panel point.
7. See drawings and specifications for uplift loads. Design joists and furnish bridging as required to resist and support uplift loads.

STEEL DECK

1. The metal decking shall be of the type and gauge as indicated on the drawings. Decking and all accessories shall be formed from steel sheets conforming to ASTM A653. The steel shall be zinc coated conforming to ASTM A924, Class G60 as required in the specifications. Deck units shall be continuous over three or more spans where possible.
2. Diaphragm action shall be provided for in all areas with welding pattern in accordance with manufacturer's recommendations.
3. All welding of metal deck shall be in accordance with AWS D1.3.
4. Hangers supported by metal decking with structural concrete fill shall be installed using ICBO-approved anchorage systems. Such hangers shall be used to support duct work 54" x 16" maximum, 4" diameter pipe maximum, or ceilings. Hangers must be two flutes apart on same deck span. Larger ductwork and piping shall be supported by structural beams or columns (see mechanical drawings).
5. Hanging directly from roof deck shall not be permitted.
6. All metal deck shall be welded to structural steel by qualified welders experienced in welding light-gauge steel, and using prequalified procedures. The erector shall establish a welding procedure for the arc spot welding weld of the steel decking to the structural steel of a particular gauge used. Prior to the start of erection of steel deck, each welder shall be qualified using this procedure and witnessed by the Owner's testing agency.
7. Section properties shall be determined according to the Light Gauge Steel Institute.
8. Comply with Steel Deck Institute Specifications for deck attachment and connectors.
9. Steel deck shall be erected and fastened in accordance with the manufacturer's specifications and erection layouts.

POST-INSTALLED ANCHORS

1. Anchorage to hardened concrete or masonry shall include torque controlled expansion anchors and adhesive anchors of size, number and spacing as shown on the drawings.
2. All anchors shall be installed in accordance with the Manufacturer's Printed Installation Instructions (MPII).
3. Existing reinforcing bars in the concrete or masonry may conflict with specific anchor locations. Reinforcing bars shall not be cut unless specifically noted on the drawings or approved by the Engineer of Record. The contractor shall review the structural drawings and shall locate the position of reinforcing bars in the vicinity of the anchors, by ground penetrating radar (GPR), x-ray, or other means.
4. Anchors shall be installed in holes drilled with a rotary impact hammer drill. Core drilling of holes is not permitted. Holes and anchor shall be thoroughly cleaned per the MPII prior to installation of the anchor.
5. Stainless steel anchors shall be used at all exterior locations and where specifically noted on the drawings.
6. Remove and replace misplaced or malfunctioning anchors. Patch failed anchor locations with high-strength non-shrink, non-metallic grout.
7. Installed adhesive anchors shall be securely held in-place to prevent displacement while the adhesive cures.
8. All anchors supporting structural elements shall be enclosed with a fire-resistance-rated envelope or protected by approved fire-resistance rated materials.
9. Quality Control:
   - A. All anchors shall be periodically inspected to meet the requirements of MPII and the ICC-ES ESR report for the product.
   - B. All anchor installers shall be trained by the manufacturer or manufacturer's representative for each individual product being installed.
10. Submittals:
    - A. Technical product literature, highlighting each anchor and size to be used on the project.
    - B. Manufacturer's Printed Installation Instructions (MPII) for each anchor type.
    - C. Engineering Design Data: For each substitution request, provide calculations substantiating specified design requirements, sealed by a professional engineer licensed in the jurisdiction where project is located.
11. Where a specific type of anchorage is indicated on the drawings, substitution for a different type of anchorage shall meet the requirements of ACI 355.2 Category 1 or ACI 355.4 Category 1 for anchorage into concrete or shall have an ICC-ES ESR report for anchorage into masonry. Substitution shall not be permitted without prior written approval of the Engineer of Record.
12. Anchors to hardened concrete shall be supplied as an entire system and shall be as follows:
    - A. Torque Controlled Expansion Anchors (Expansion Anchors) in cracked and un-cracked concrete as indicated on the drawings shall be Hilti KWIK Bolt TZ Expansion Anchor (ICC-ES Evaluation Report: ESR# 1917).
    - B. Adhesive anchors in cracked and un-cracked concrete indicated on the drawings shall be Hilti HIT-HY 200 Safe Set Adhesive Anchoring System (ICC-ES Evaluation Report: ESR# 3187). The following anchor rods shall be used with the system:
      1) Reinforcing bar meeting the requirements of ASTM A615/A706 Grade 60.
      2) All-threaded rod shall be Hilti HIT-Z rods.
13. Requirements and design parameters of post-installed anchors into hardened concrete:
    - A. Concrete shall have a minimum compressive strength of 2,500 psi and a minimum age of 21-days at the time of installation for adhesive anchors and 7-days for expansion anchors.
    - B. Concrete temperature at the time of installation of adhesive anchors shall be a minimum of 50°F.
    - C. Concrete may be water saturated or dry; water filled holes shall not be allowed.
    - D. Embedment depth and anchor projection shall be as detailed on the drawings. Unless otherwise noted, minimum embedment depths, spacing, and edge distance shall be by the table below.
14. Anchors into masonry shall be supplied as an entire system and shall be as follows:
    - A. Torque Controlled Expansion Anchors (Expansion Anchors) in solid or grout filled masonry as indicated on the drawings shall be Hilti KWIK Bolt 3 Expansion Anchor (ICC-ES Evaluation Report: ESR# 1385).
    - B. Adhesive anchors in hollow, solid or grout filled masonry as indicated on the drawings shall be Hilti HIT-HY 70 Hybrid for Masonry Construction (ICC-ES Evaluation Report: ESR# 3342). Screen tubes shall be used for all connections to hollow masonry. The following anchor rods shall be used with the system:
      1) All-threaded rod shall be Hilti HAS-E rod.
      2) Stainless steel anchor rods shall be AISI Type 304 or 316.
15. Requirements and design parameters of post-installed anchors into masonry:
    - A. Masonry grout shall have a minimum compressive strength of 2,000 psi and a minimum age of 21-days at the time of installation for adhesive anchors and 7-days for expansion anchors.
    - B. Masonry temperature at the time of installation of adhesive anchors shall be between 41°F, and 104°F.
    - C. Masonry may be water saturated or dry; water filled holes shall not be allowed.
    - D. Embedment depth and anchor projection shall be as detailed on the drawings. Unless otherwise noted, minimum embedment depths, spacing, and edge distance shall be by the table below.

Post-installed Concrete Anchors						
	Torque-controlled Anchors			Adhesive Anchors		
Diameter	Minimum Embed.	Min. Edge Distance	Minimum Spacing	Minimum Embed.	Min. Edge Distance	Minimum Spacing
3/8" #3	2"	4 1/2"	5"	4 1/2"	3 1/2"	4 1/2"
1/2" #4	3 1/4"	7 1/2"	5 3/4"	6"	4 1/2"	6"
5/8" #5	4"	8 3/4"	6"	7 1/2"	5 1/2"	7 1/2"
3/4" #6	4 3/4"	10"	9"	8 1/2"	7"	8 1/2"
#7				10 1/2"	10 1/2"	10 1/2"
#8				12"	12"	12"
#9				13 1/2"	13 1/2"	13 1/2"

Post-installed Masonry Anchors						
	Torque-controlled Anchors			Adhesive Anchors		
Diameter	Minimum Embed.	Min. Edge Distance	Minimum Spacing	Minimum Embed.	Min. Edge Distance	Minimum Spacing
3/8"	2 1/2"	5"	6"	3 1/2"	12"	13 1/2"
1/2"	3 1/2"	7 1/4"	7 3/4"	4 1/2"	12"	18"
5/8"	4"	8 1/2"	9"	5 3/4	20"	22 1/2"
3/4"	4 3/4"	9 3/4"	10 3/4"	6 3/4"	20"	27"

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EXPIRATION DATE
12-31-2023

THIS DWG :
GENERAL NOTES

COMM 17186
DATE 02-24-2022

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STRUCTURAL TESTING AND SPECIAL INSPECTIONS

Structural testing and special inspections are required. The owner shall engage a qualified independent testing agency to conduct structural testing and special inspections. Special inspectors shall be employed or retained by the approved testing agency and have the recommended experience and certifications as summarized in Appendix C of the current International Code Counsel (ICC) Special Inspection Manual. The testing agency may employ or retain multiple special inspectors with differing areas of expertise as required for the project.

At or before project completion, the qualified testing agency shall submit a written summary statement indicating that applicable structural testing and special inspections have been completed. The written summary statement shall clearly identify non-compliant test and inspection results. The written summary statement shall be sealed by the testing agencies supervising professional engineer and be submitted to the owner, building official, and design professionals. The required testing and inspections are indicated in the following table.

Description of Structural Special Inspection & Testing Requirements

Verification and Inspection	Frequency	Referenced Standard	BC Reference	Additional Notes
Soils				
Foundation Bearing & Fill Placement				
Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Periodic	Geotechnical Report	N/A	
Verify excavations are extended to proper depth and have reached proper material.	Periodic	Geotechnical Report	N/A	
Perform classification and testing of compacted fill materials.	Periodic	Geotechnical Report	N/A	
Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	Continuous	Geotechnical Report	N/A	
Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly.	Periodic	Geotechnical Report	N/A	
Verify all requirements of geotechnical report are met.	Periodic	Geotechnical Report	N/A	

Description of Structural Special Inspection & Testing Requirements

Verification and Inspection	Frequency	Referenced Standard	BC Reference	Additional Notes
Concrete				
Cast-In-Place Concrete				
Inspect reinforcing steel including prestressing tendons: a. Verify reinforcing bar grade. b. Verify reinforcing bars are free of dirt, excessive rust, and damage. c. Verify reinforcing bars are adequately tied, chaired, and supported to prevent displacement during concrete placement. d. Verify proper clear distances between bars and to surfaces of concrete. e. Verify reinforcing bar size and placement. f. Verify bar laps for proper length and stagger. g. Verify mechanical splices placement and attachment. h. Verify epoxy or galvanized coating and coating damage is repaired.	Periodic - Prior to each pour.	ACI 318: Ch 20, 25.2, 25.3, 26.1-26.6.3	1908.4	
Inspection of reinforcing steel welding: a. Verify weldability of reinforcing steel. b. Verify proper electrodes and storage of electrodes. c. Verify proper joint preparation. d. Inspect single- pass fillet welds, maximum 5/16". e. Inspect all other welds. d. Review welder certifications for both fabricator's shop staff and field erectors.	Periodic Periodic Continuous Periodic Continuous Each welder	AWS D1.4 ACI 318: 26.6.4		
Inspect embedments, bolts, headed bolts, and headed studs to be installed in concrete prior to and during concrete placement.	Periodic	ACI 318: 17.8.2	N/A	
Verify use of required mix design: a. Verify mixer truck trip ticket conforms to approved mix design. b. Verify that total water added to mix on site does not exceed that allowed by the concrete mix design. c. Verify that concrete quality is indicative of adequate mixing time, consistency, and relevant time limits.	Periodic - Prior to each pour.	ACI 318: 26.4.3 ACI 301, ACI 214R	1904.1 1904.2 1908.2 1918.3	
Inspect formwork for cleanliness, shape, location and dimensions of the concrete member being formed.	Periodic - Prior to each pour.	ACI 318: 26.11.1.2(b)	N/A	
Inspect concrete and shotcrete placement for proper application techniques, including proper consolidation, reinforcement remains at proper location, and conveyance and depositing avoid segregation and contamination.	Continuous	ACI 318: 26.5	1908.6 1908.7 1908.8	
Sample fresh concrete:	Obtain one composite sample of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cy. of concrete nor less than once for each 5,000 sqft. of surface area for slabs or walls. If the total volume of concrete is such that frequency of testing required would provide less than five composite samples for a given class of concrete, tests shall be made from at least five randomly selected batches (per ASTM D3665) or from each batch if fewer than five batches are used.	ACI 318: 26.4 ASTM C 172	1908.10	A composite sample shall consist of the following: five 4" diameter cylinders, or four 6" diameter cylinders.
Obtain test cylinders of concrete.	One set of five 4" diameter cylinders or four 6" diameter cylinders for each composite sample.	ACI 318: 26.12 ASTM C 31	N/A	Cast additional cylinders at contractor's request and expense for field cured specimens to determine shoring removal, early strength for post-tensioning, etc.
Obtain grout cubes for deferred placed concrete toppings	One set of three 2" molded-cube for each composite sample.	ASTM C 109	N/A	
Perform slump tests.	One test at point of discharge for each composite sample.	ASTM C 143	N/A	
Perform air content tests.	One test at point of discharge for each composite sample.	ASTM 231 pressure method for normalweight concrete; ASTM C 173, volumetric method for lightweight concrete	N/A	
Determine the temperature of fresh concrete.	One test for each composite sample, and test hourly and when air temperature is below 40 F or when above 80 F.	ASTM C 1064	N/A	
Determine the unit weight of fresh lightweight concrete.	One test at point of discharge for each composite sample of lightweight concrete.	ASTM C567	N/A	
Review and inspect cold weather concrete procedures and placement.	Periodic - Prior to each pour.	ACI 306.1 ACI 318 26.5.4		
Review and inspect hot weather concrete procedures and placement.	Periodic - Prior to each pour.	ACI 305.1 ACI 318 26.5.5		
Inspect for maintenance of specified curing temperature and techniques.	Periodic - After each pour.	ACI 318: 26.5.3	1908.9	
Laboratory test concrete cylinders for compressive strength.	One specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.	ACI 318: 26.12 ASTM C 39	N/A	Three specimens shall be tested at 28 days if using 4" diameter cylinders. Test additional cylinders at contractor's request and expense.
Laboratory test concrete cubes for compressive strength for deferred placement toppings.	Test one set of three specimens at 28 days.	ASTM C 109	N/A	
Inspect anchors post- installed into hardened concrete a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. All other Mechanical anchors and adhesive anchors not defined in a.	Continuous Periodic	ACI 318: 17.8.2.4 ACI 318: 17.8.2	N/A	
Measure & report floor slab levelness (FL) and flatness (FF) for shored, non-cambered, and non-inclined surfaces.	Measure all floors within 24 hours of finishing.	ACI 117 4.8.5 ASTM E1155	N/A	
Measure & report floor slab flatness for cambered, unshored, and inclined surfaces.	Measure the gap under a freestanding (unleveled) 10 ft. straightedge.	ACI 117: 4.8.6	N/A	
Deferred placement floor toppings shall be tested for delamination by dragging a steel chain over the surface.	All floor areas after 28 days.	N/A	N/A	

Description of Structural Special Inspection & Testing Requirements

Verification and Inspection	Frequency	Referenced Standard	BC Reference	Additional Notes
Masonry				
Level B Inspection of Masonry				
Verification of f'm and FAAC prior to construction.	Periodic	ACI 530.1: Art. 1.4B	N/A	
Verify slump flow and VSI delivered to the site for self-consolidating grout.	Continuous	ACI 530.1: Art. 1.5B.1.b.3	N/A	
Verify compliance with approved submittals.	Periodic	ACI 530.1: Art. 1.5	N/A	
As masonry construction begins, the following shall be verified to ensure compliance:				
Verify proportions of site-prepared mortar.	Periodic	ACI 530.1: Art. 2.1, 2.6A	N/A	
Verify construction of mortar joints.	Periodic	ACI 530.1: Art. 3.3B	N/A	
Verify location of reinforcement and connectors.	Periodic	ACI 530.1: Art. 3.4	N/A	
During construction the inspection program shall verify:				
Verify size and location of structural elements.	Periodic	ACI 530.1: Art. 3.3F	N/A	
Verify type, size, and location of anchors, including other details of anchorage of masonry to structural members, frames, or other construction.	Periodic	ACI 530: 1.2.1(e), 6.1.4.3, 6.2.1	N/A	
Verify specified size, grade, and type of reinforcement and anchor bolts.	Periodic	ACI 530: 6.1 ACI 530.1: Art. 2.4	N/A	
Verify welding of reinforcing bars.	Continuous	ACI 530: 8.1.6.7.2, 9.3.3.4 (c) 11.3.3.4 (b)	N/A	
Verify preparation, construction and protection of masonry during cold weather (temperature below 40° F)	Periodic	ACI 530.1: Art. 1.8C	N/A	
Verify preparation, construction and protection of masonry during hot weather (temperature above 90° F)	Periodic	ACI 530.1: Art. 1.8D	N/A	
Prior to grouting, the following shall be verified to ensure compliance:				
Verify grout space is clean.	Periodic	ACI 530.1: Art. 3.2D, 3.2F	N/A	
Verify placement of reinforcement and connectors.	Periodic	ACI 530: 6.1 ACI 530.1: Art. 2.4	N/A	
Verify proportions of site-prepared grout.	Periodic	ACI 530.1: Art. 2.6B, 2.4 G.1.b	N/A	
Verify construction of mortar joints.	Periodic	ACI 530.1: Art. 3.3B	N/A	
Verify grout placement.	Continuous	ACI 530.1: Art. 3.5	N/A	
Observe preparation of any required grout specimens, mortar specimens and/or prisms.	Periodic	ACI 530.1: Art. 1.4 B.2.a.3, 1.4 b.2.b.3, 1.4 b.2.c.3, 1.4 B.3, 1.4 B.4	N/A	

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2901 REGENT AVENUE NE
CANTON, OHIO 44705

STATE OF OHIO
R.W.MEADOWS
6781
REGISTERED ARCHITECT
RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
12-31-2023

THIS DWG :
SPECIAL INSPECTIONS

COMM 17186
DATE 02-24-2022

DWG
S-0.3

ISSUED FOR BID

2217 East 9th Street, Suite 350
Cleveland OH 44115-1257
216-875-0100/ (F) 216-875-0111
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Consulting Engineers

Description of Structural Special Inspection & Testing Requirements				
Verification and Inspection	**Frequency**	**Referenced Standard**	**BC Reference**	**Additional Notes**
Metals				
Structural Steel				
Inspection Tasks Prior to Welding:		AISC 360 Table N5.4-1	2204.1	
Verify procedure specifications (WPS) available	Perform	AISC 360 Section N5.4		
Manufacturer certifications for welding consumables available.	Perform	AISC 360 Section N5.4		
Material identification (type/grade)	Observe	AISC 360 Section N5.4		
Check identification system	Observe	AISC 360 Section N5.4		
Fit up of groove welds a. Joint preparation b. Dimensions (alignment, root opening, root face, bevel) c. Cleanliness (condition of steel surface) d. Tacking (tack weld quality and location) e. Backing type and fit	Observe	AISC 360 Section N5.4		
Configuration and finish of access holes	Observe	AISC 360 Section N5.4		
Fit up of fillet welds a. Dimensions (alignment,gaps at root) b. Cleanliness (condition of steel surface) c. Tacking(tack weld quality and location)	Observe			
Inspection Tasks During Welding:		AISC 360 Table N5.4-2	2204.1	
Use of qualified welders	Observe	AISC 360 Section N5.4		
Control and handling of welding consumables a. Packing b. Exposure control	Observe	AISC 360 Section N5.4		
No welding over cracked tack welds	Observe	AISC 360 Section N5.4		
Environmental conditions a. Wind speed within limits b. Precipitation and temperature	Observe	AISC 360 Section N5.4		
WPS followed a. Settings on welding equipment b. Travel speed c. Selected welding material d. Shielding gas type/flow rate e. Preheat applied f. Interpass temperature maintained g. Proper position (F,V,H,OH)	Observe	AISC 360 Section N5.4		
Welding techniques a. Interpass and final cleaning b. Each pass within profile limitations c. Each pass meets quality requirements	Observe	AISC 360 Section N5.4		
Inspection Tasks After Welding:		AISC 360 Table N5.4-3	2204.1	
Welds cleaned	Observe	AISC 360 Section N5.4		
Size,length and location of welds	Perform	AISC 360 Section N5.4		
Welds meet visual acceptance criteria a. Crack prohibition b. Weld/base-metal fusion c. Crater cross section d. Weld profiles e. Weld size f. Undercut g. Porosity	Perform	AISC 360 Section N5.4		
Arc strikes	Perform	AISC 360 Section N5.4		
k-Area (When welding of doubler plate, continuity plates or stiffeners in k-area, visually inspect the wed k-area for crack with in 3 in.)	Perform	AISC 360 Section N5.4		
Backing removed and weld tabs removed (if required)	Perform	AISC 360 Section N5.4		
Repair activities	Perform	AISC 360 Section N5.4		
Document acceptance or rejection of welded joint or member	Perform	AISC 360 Section N5.4		
Inspection of Welding in Field and in Non AISC Certified Shops: a. Complete joint penetration groove welds subject to transversely applied tension loading in butt, T and corner joints with materials 5/16 inches or thicker. b. Welder qualifications.	Test 100% of welds by ultrasonic testing for risk category III or IV. Test 10% of welds by ultrasonic testing for risk category II.	AISC 360 Section N5.5		All welds subject to non-destructive testing shall also meet visual acceptance criteria per AWS Table 6.1.
Inspection Tasks Prior to Bolting:		AISC 360 Table N5.6-1	2204.2	
Manufacturer's certifications available for fastener materials	Perform	AISC 360 Section N5.6		
Fasteners marked in accordance with ASTM requirements	Observe	AISC 360 Section N5.6		
Proper fasteners selected for the joint detail (grade, type, bolt length if threads are to be excluded from shear plane)	Observe	AISC 360 Section N5.6		
Proper bolting procedure selected for joint detail	Observe	AISC 360 Section N5.6		
Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements	Observe	AISC 360 Section N5.6		
Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used	Observe	AISC 360 Section N5.6		
Proper storage provided for bolts,nuts washers and other fastener components	Observe	AISC 360 Section N5.6		
Inspection Tasks During Bolting:		AISC 360 Table N5.6-2	2204.2	
Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required	Observe	AISC 360 Section N5.6		
Joint brought to the snug- tight condition prior to the pretensioning operation	Observe	AISC 360 Section N5.6		
Fastener component not turned by the wrench prevented from rotating	Observe	AISC 360 Section N5.6		
Fasteners are pretensioned in accordance with the RCSC specification, progressing systematically from the most rigid point toward the free edges	Observe	AISC 360 Section N5.6 AISC 348		
Inspection Tasks After Bolting:		AISC 360 Table N5.6-3	2204.2	
Document acceptance or rejection of bolted connections	Perform	AISC 360 Section N5.6		
Inspection of Steel Frame: a. Verify installation of all members. b. Verify proper application of details to each joint and connection. c. Verify bracing and stiffening of framing members. d. Verify members and detail critical to frame stability.	Perform	AISC 360 Section N5.7		
Verify Material Grade of Structural Steel: a. Verify identification markings conform to AISC 360 for materials specified in the approved construction documents. b. Manufacturer's certificate of compliance required.	Observe	AISC 360 Section N5.7		
Inspection of anchor rods and other embedments supporting structural steel: a. Verify the diameter, grade, type and length of anchor rod or embedded item b. Verify the extent or depth of embedment into concrete prior to placement of concrete.	Observe	AISC 360 Section N5.7		
Inspection of Welding and Bolting in AISC Certified Shop: a. Review Fabricator's Certificate of Compliance for certified fabricators shop.	Once for Each Fabricator	AISC 360 Section N7	1704.2	

Description of Structural Special Inspection & Testing Requirements				
Verification and Inspection	**Frequency**	**Referenced Standard**	**BC Reference**	**Additional Notes**
Open-Web Steel Joists				
Review manufacturer's Certificate of Compliance for certified fabricators.	Once per manufacturer.	N/A	1704.2	Joist Manufacturer to be SJI Certified Manufacturer, or shop inspection is required.
Inspection of Welding in Field: a. Welder qualifications. b. Joist and Joist Girder welding.	Each Welder Requirements same as structural steel welding.	AWS D1.1 AWS D1.1	1704.3.1 1704.3.1	
End connections welded or bolted	Periodic	SJI specs listed in section 2207.1.		
Bridging horizontal or diagonal: a. Standard bridging. b. Bridging that differs from SJI specs listed in section 2207.1.	Periodic Periodic	SJI specs listed in section 2207.1.		
Metal Decking				
Review manufacturer's Certificate of Compliance for certified fabricators.	Once per manufacturer.	N/A	1704.2	Deck Manufacturer shall be SDI Certified Manufacturer, or shop inspection is required.
Inspection or Execution Tasks Prior to Deck Placement: a. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness b. Document acceptance or rejection of deck and deck accessories	Perform Perform	SDI QA/QC 2017 Table 1.1	N/A	
Inspection or Execution Tasks After Deck Placement: a. Verify compliance of deck and all deck accessories with construction documents, b. Verify deck materials are represented by mill certifications that comply with the construction documents. c. Document acceptance or rejection of installation of deck and deck accessories.	Perform Perform Perform	SDI QA/QC 2017 Table 1.2	N/A	
Inspection or Execution Tasks Prior to Welding: a. Verify procedure specifications (WPS) available b. Manufacturer certifications for welding consumables available. c. Material identification (type/grade) d. Check welding equipment	Observe Observe Observe Observe	SDI QA/QC 2017 Table 1.3	N/A	
Inspection or Execution Tasks During Welding: a. Use of qualified welders b. Control and handling of welding consumables c. Environmental conditions (wind speed, moisture, temperature) d. WPS followed	Observe Observe Observe Observe	SDI QA/QC 2017 Table 1.4	N/A	
Inspection or Execution Tasks After Welding: a. Verify size and location of weld, including support, sidelap, and perimeter welds. b. Welds meet visual acceptance criteria c. Verify repair activities d. Document acceptance or rejection of welds	Perform Perform Perform Perform	SDI QA/QC 2017 Table 1.5	N/A	
Inspection or Execution Tasks Prior to Mechanical Fastening: a. Manufacturer installation instructions available for mechanical fasteners b. Proper tools available for fastener installation c. Proper storage for mechanical fasteners	Observe Observe Observe	SDI QA/QC 2017 Table 1.6	N/A	
Inspection or Execution Tasks During Mechanical Fastening: a. Fasteners are positioned as required b. Fasteners are installed in accordance with manufacturer's instructions	Observe Observe	SDI QA/QC 2017 Table 1.7	N/A	
Inspection or Execution Tasks After Mechanical Fastening: a. Check spacing, type, and installation of support fasteners b. Check spacing, type, and installation of sidelap fasteners c. Check spacing, type, and installation of perimeter fasteners d. Verify repair activities e. Document acceptance or rejection of mechanical fasteners	Perform Perform Perform Perform Perform	SDI QA/QC 2017 Table 1.8	N/A	
Cold-Formed Metal Framing				
Review manufacturer's Certificate of Compliance for certified fabricators.	Once per manufacturer.	N/A	1704.2	Shop inspection is required if the manufacturer is not certified.
Review welder certifications for both fabricator's shop staff and field erectors.	Each Welder.	N/A	N/A	
Verify temporary installation restraint/bracing and permanent individual truss member restraint/bracing.	Continuous for truss spans greater than 60'-0"	N/A	N/A	
Verify drag struts, braces, and shear wall strapping, hold-downs, end posts, sheathing thickness, attachment size, quantity, and pattern.	Periodic	N/A	N/A	

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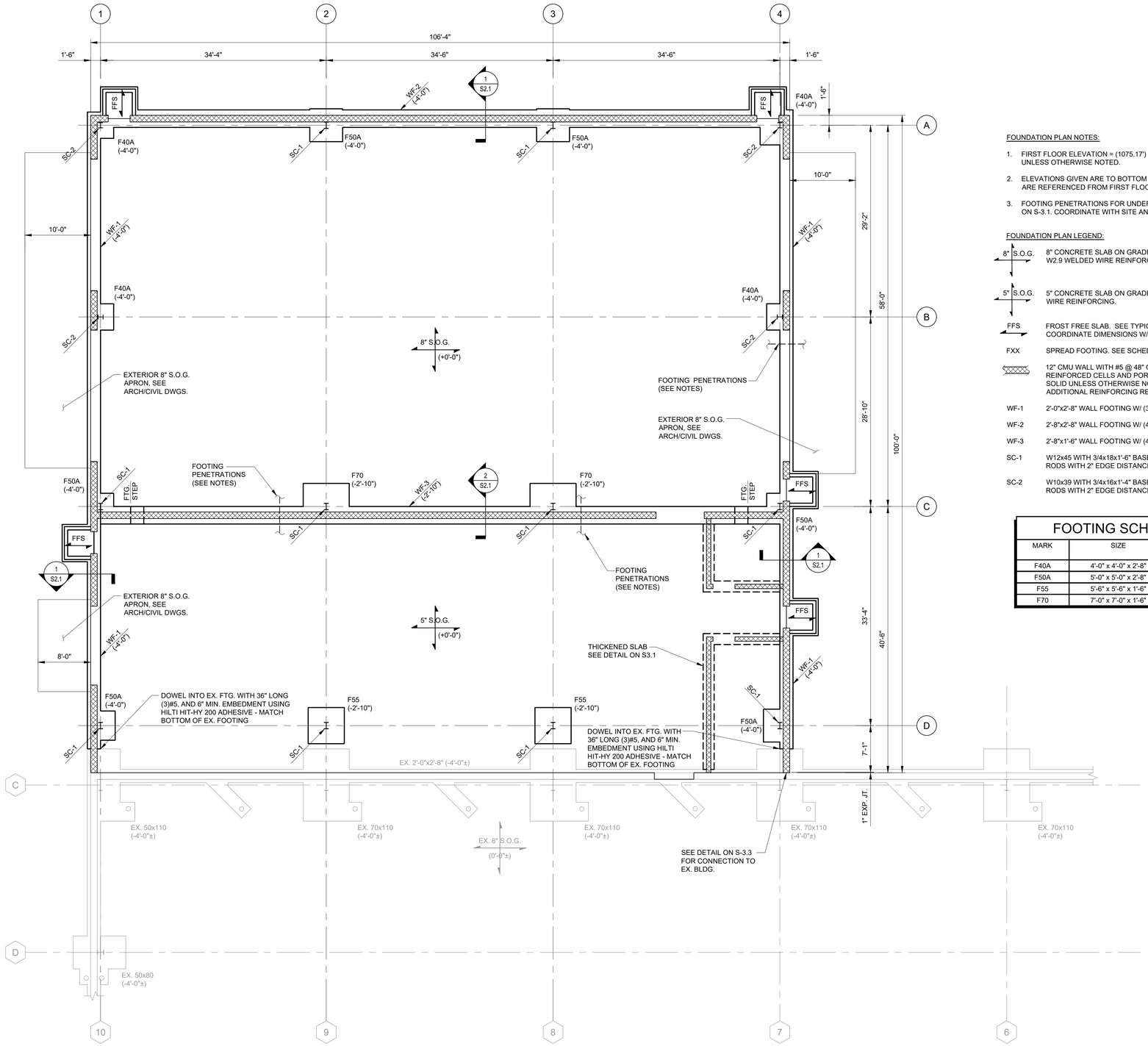

FOUNDATION PLAN
1/8"=1'-0"

FOUNDATION PLAN NOTES:

1. FIRST FLOOR ELEVATION = (1075.17') = REFERENCE ELEVATION (0'-0") UNLESS OTHERWISE NOTED.
2. ELEVATIONS GIVEN ARE TO BOTTOM OF FOOTING, TOP OF SLAB AND ARE REFERENCED FROM FIRST FLOOR ELEVATION (0'-0").
3. FOOTING PENETRATIONS FOR UNDERGROUND UTILITIES. SEE DETAIL ON S-3.1. COORDINATE WITH SITE AND MECHANICAL DRAWINGS.

FOUNDATION PLAN LEGEND:

8" S.O.G.	8" CONCRETE SLAB ON GRADE WITH 2 LAYERS OF 6x6-W2.9 x W2.9 WELDED WIRE REINFORCING.
5" S.O.G.	5" CONCRETE SLAB ON GRADE WITH 6x6-W2.9 x W2.9 WELDED WIRE REINFORCING.
FFS	FROST FREE SLAB. SEE TYPICAL DETAIL ON S3-1. COORDINATE DIMENSIONS W/ ARCHITECTURAL & SITE PLANS.
FXX	SPREAD FOOTING. SEE SCHEDULE THIS SHEET.
	12" CMU WALL WITH #5 @ 48" O.C. FULL HEIGHT. GROUT REINFORCED CELLS AND PORTION OF WALL BELOW GRADE SOLID UNLESS OTHERWISE NOTED. SEE SHEET S-3.3 FOR ADDITIONAL REINFORCING REQUIREMENTS.
WF-1	2'-0"x2'-8" WALL FOOTING W/ (3) #5 TOP AND BOTTOM.
WF-2	2'-8"x2'-8" WALL FOOTING W/ (4) #5 TOP AND BOTTOM.
WF-3	2'-8"x1'-6" WALL FOOTING W/ (4) #5.
SC-1	W12x45 WITH 3/4x18x1'-6" BASE PLATE AND (4) 3/4"ø ANCHOR RODS WITH 2" EDGE DISTANCE. SEE DETAIL ON S-3.1.
SC-2	W10x39 WITH 3/4x16x1'-4" BASE PLATE AND (4) 3/4"ø ANCHOR RODS WITH 2" EDGE DISTANCE. SEE DETAIL ON S-3.1.

FOOTING SCHEDULE

MARK	SIZE	REINFORCEMENT (EACH WAY)
F40A	4'-0" x 4'-0" x 2'-8"	(4) #4 T&B
F50A	5'-0" x 5'-0" x 2'-8"	(5) #4 T&B
F55	5'-6" x 5'-6" x 1'-6"	(5) #4
F70	7'-0" x 7'-0" x 1'-6"	(4) #6

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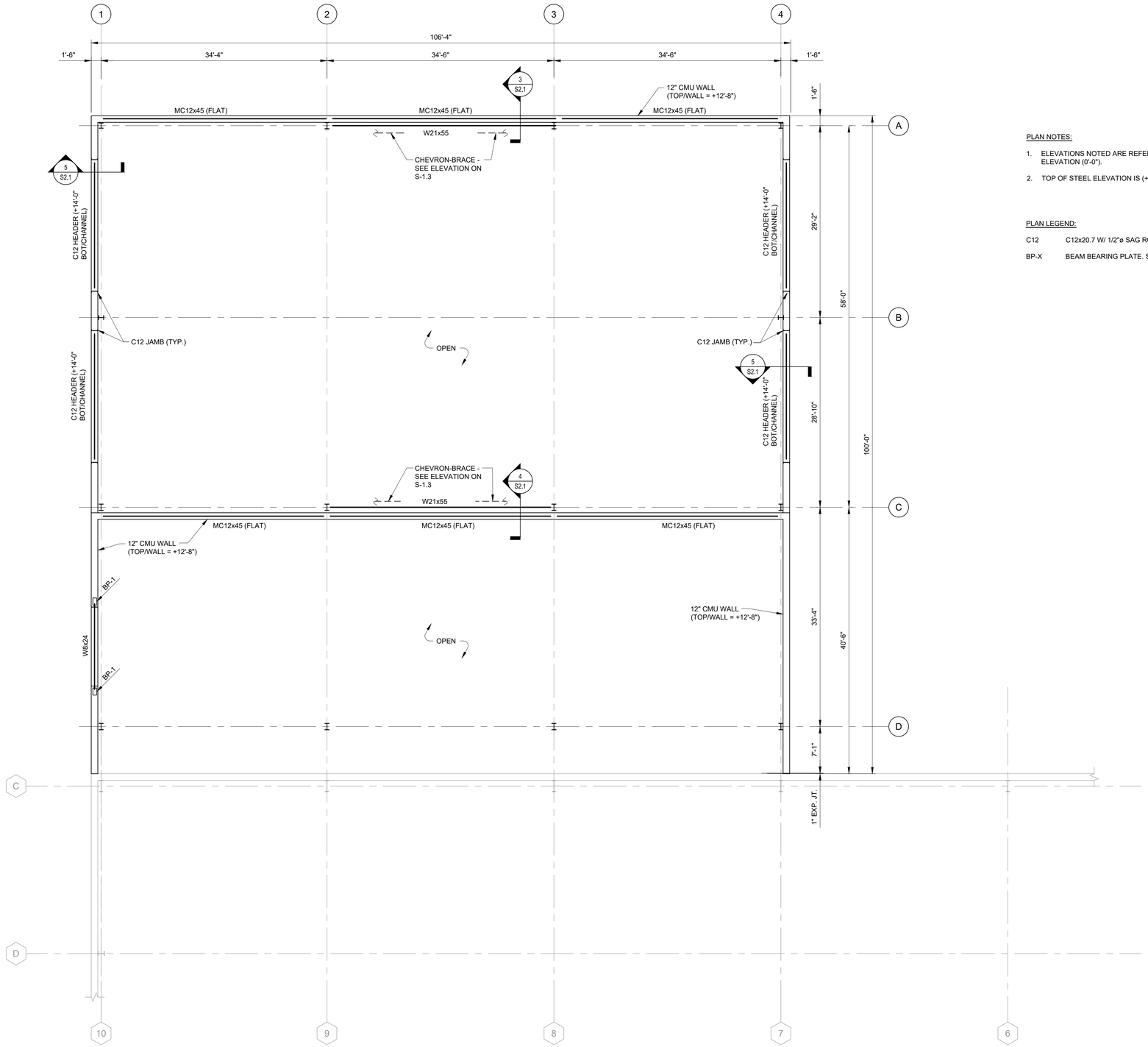

FRAMING PLAN AT ELEVATION 12'-8"

1/8"=1'-0"

PLAN NOTES:

1. ELEVATIONS NOTED ARE REFERENCED FROM FIRST FLOOR ELEVATION (0'-0").
2. TOP OF STEEL ELEVATION IS (+12'-8") UNLESS OTHERWISE NOTED.

PLAN LEGEND:

C12	C12x20.7 W/ 1/2"ø SAG RODS AT QUARTER POINTS OF BEAM
BP-X	BEAM BEARING PLATE. SEE DETAIL ON S-3.3.

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THIS DWG :
FRAMING PLAN
@ 12'-8"

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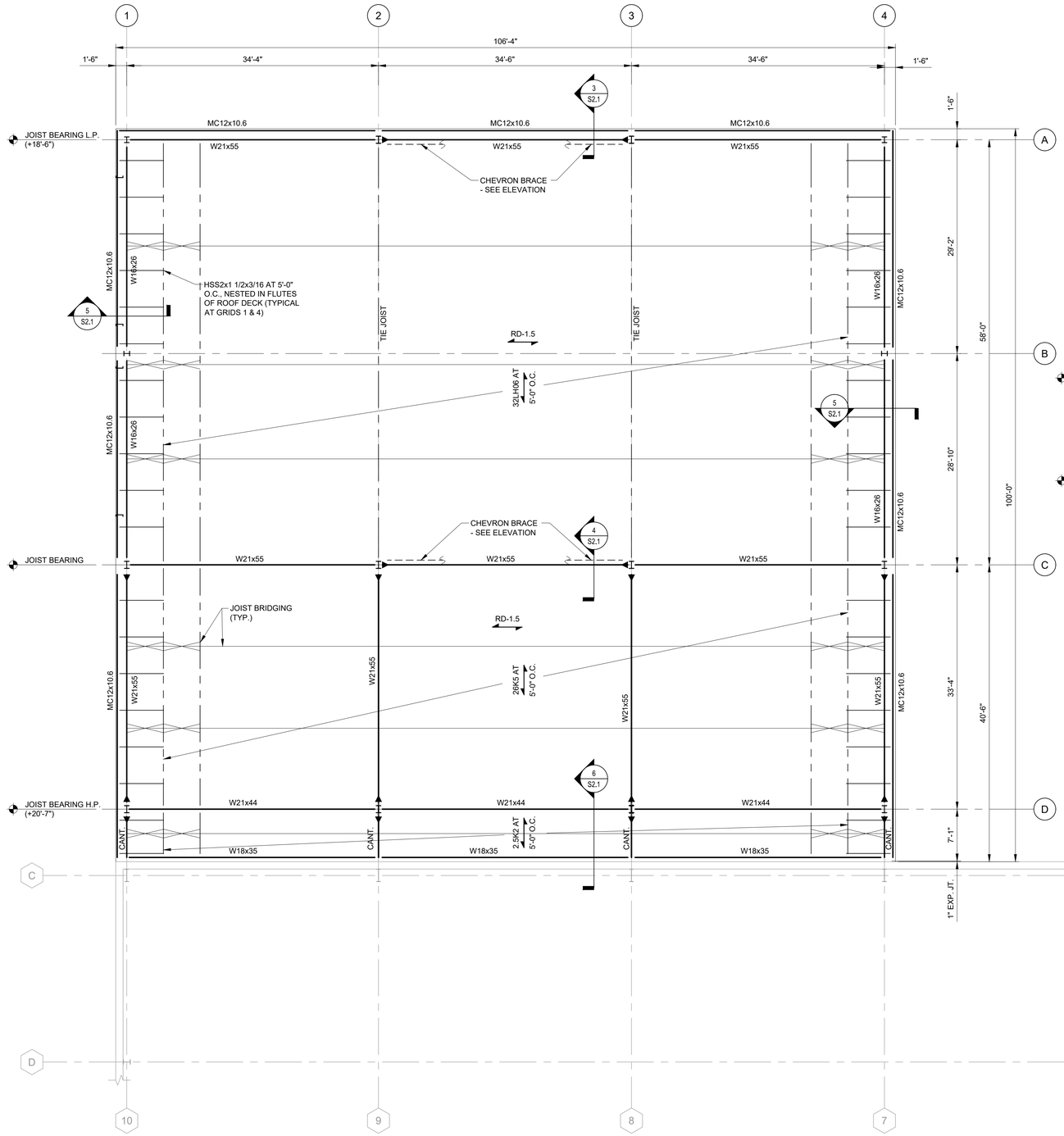


ROOF FRAMING PLAN
1/8"=1'-0"

ROOF PLAN NOTES:

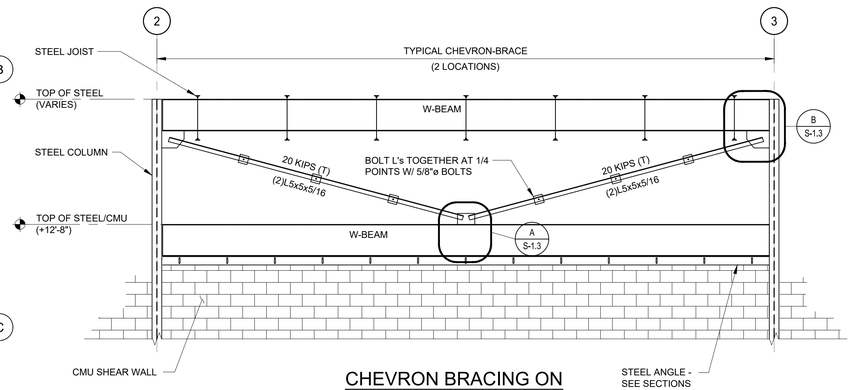
1. ELEVATIONS NOTED ARE REFERENCED FROM FIRST FLOOR ELEVATION (0'-0").
2. JOIST BEARING ELEVATIONS NOTED ON PLAN.
3. SLOPE STEEL UNIFORMLY BETWEEN BEARING ELEVATIONS GIVEN.
4. JOIST BRIDGING SHOWN IS SCHEMATIC. FINAL DESIGN BY JOIST SUPPLIER IN ACCORDANCE WITH SJI REGULATIONS.
5. UNIFORMLY SPACE JOISTS UNLESS OTHERWISE NOTED.

ROOF PLAN LEGEND:

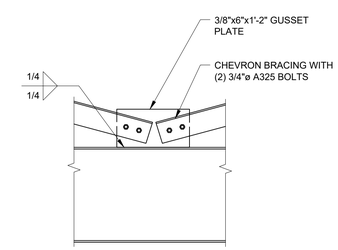
RD-1.5 — 1 1/2", 20 GAGE, TYPE B, WIDE RIB GALVANIZED METAL ROOF DECK. CONNECT ROOF DECK USING 5/8"ø PUDDLE WELDS IN A 36/4 PATTERN, WITH (4) #10 TEK SCREWS PER SPAN.

FULL MOMENT CONNECTION. SEE DETAIL ON S-3.2.

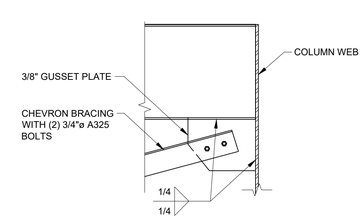
CANT. — CANTILEVERED BEAM TO MATCH SIZE OF BACK SPAN MEMBER.



CHEVRON BRACING ON GRIDS A & C ELEVATION
1/4"=1'-0"



DETAIL 'A'
3/4"=1'-0"



DETAIL 'B'
3/4"=1'-0"

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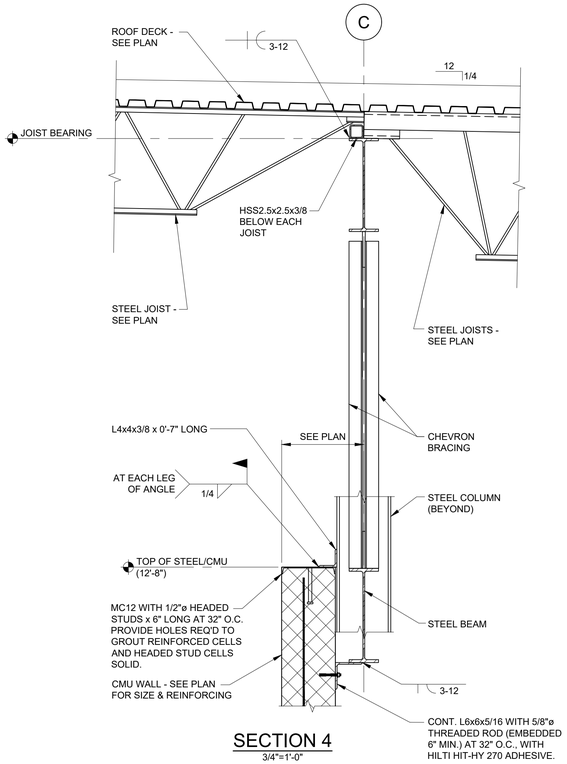
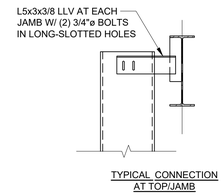
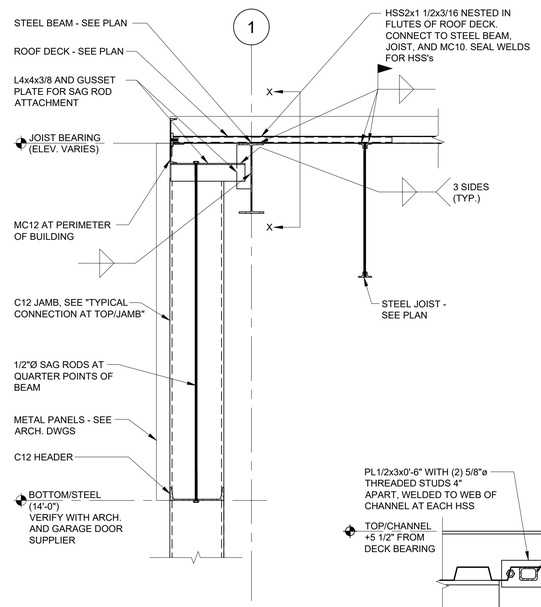


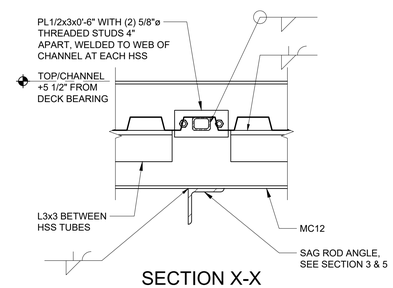
SECTION 4
3/4"=1'-0"



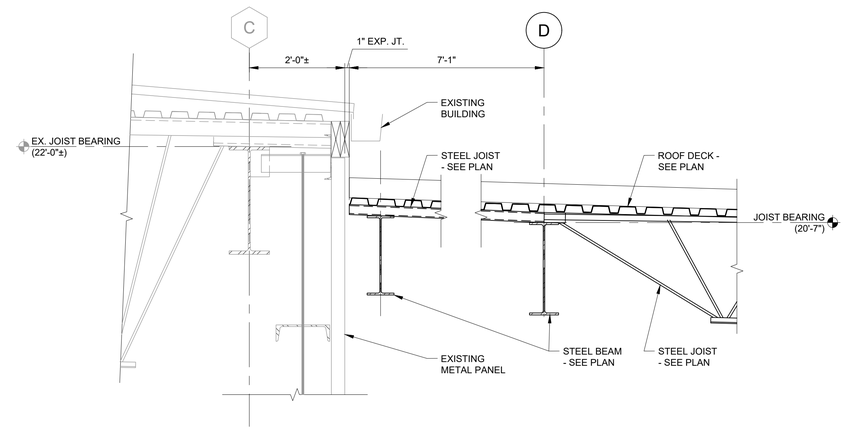
TYPICAL CONNECTION AT TOP/JAMB



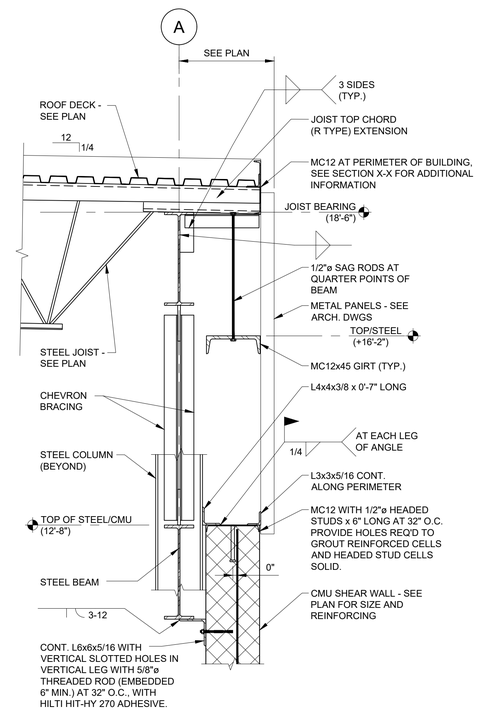
SECTION 5
3/4"=1'-0"



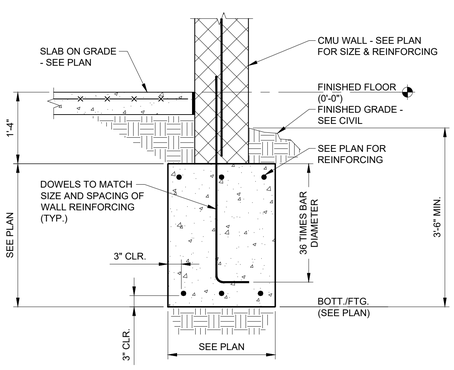
SECTION X-X
1 1/2"=1'-0"



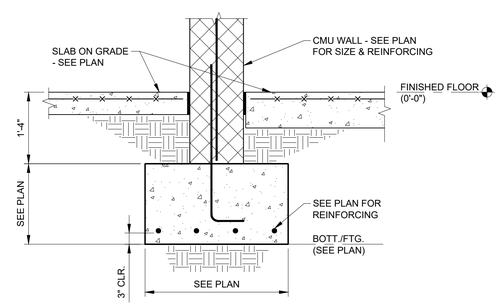
SECTION 6
3/4"=1'-0"



SECTION 3
3/4"=1'-0"



SECTION 1
3/4"=1'-0"



SECTION 2
3/4"=1'-0"

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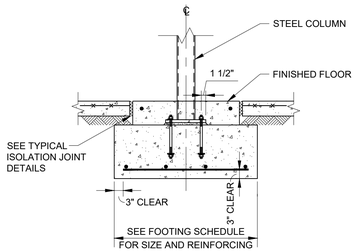
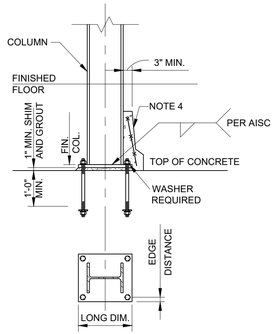
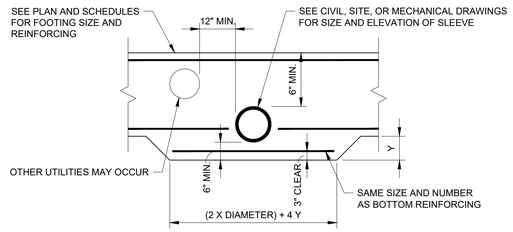


STEEL COLUMN AND FOOTING DETAIL



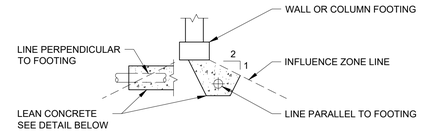
NOTES:
1. GROUT TO BE 5000 psi MIN.
2. LEVELING PLATES (OPTIONAL).
3. SEE PLAN LEGEND FOR BASE PLATE AND ANCHOR BOLTS.
4. CONCRETE PROTECTION FOR COLUMN AND BASE PLATE W/ 6x6-W1.4xW1.4 WWR BELOW GRADE AS REQUIRED. (THIS IS NOT COLUMN FIREPROOFING)

COLUMN BASE PLATE DETAIL

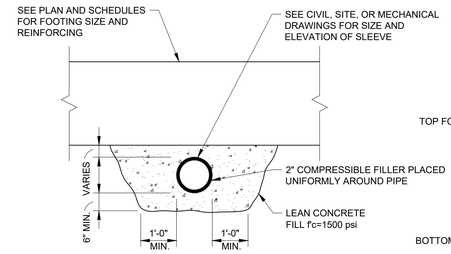


NOTE:
IF DIRECT PENETRATION OF PIPE IS REQUIRED IN LIEU OF SLEEVE, PROVIDE 2" COMPRESSIBLE FILLER, PLACED UNIFORMLY AROUND PIPE.

FOOTING REINFORCING DETAIL FOR PENETRATIONS OR SLEEVES

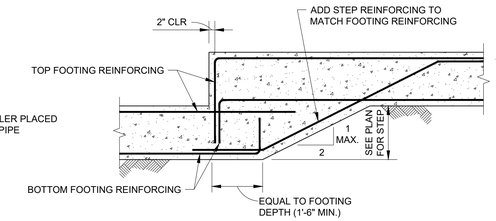


INFLUENCE ZONE



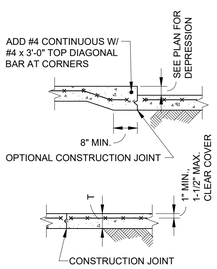
NOTE: PROVIDE CONCRETE PROTECTION AROUND UTILITY LINE WHEN LINE IS WITHIN FOOTING INFLUENCE ZONE. SEE DETAIL ABOVE FOR INFLUENCE ZONE DEFINITION

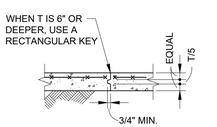
FOOTING DETAIL WITH UTILITY LINES BELOW



TYPICAL STEPPED FOOTING DETAIL

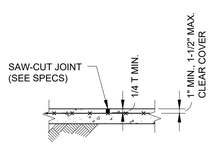
(2 LAYERS OF REINFORCING)





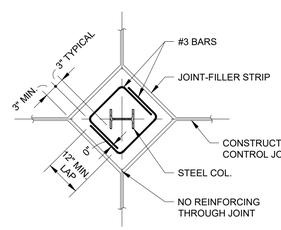
CONSTRUCTION JOINT

NOTES:
1. CONTRACTION JOINTS SHALL BE INSTALLED IN SLABS ON GROUND AT A MAXIMUM SPACING IN FEET OF 3 TIMES THE SLAB THICKNESS IN INCHES IN EACH DIRECTION (15'-0" MAXIMUM) BY EITHER OF THE METHODS SHOWN. MAXIMUM LENGTH OF ANY SLAB ON GROUND POUR TO BE 50'-0" BETWEEN CONSTRUCTION JOINTS. THIS SPACING OF JOINTS SHALL APPLY UNLESS SPECIFICALLY SHOWN OTHERWISE ON DRAWINGS.
2. REINFORCING TO BE DISCONTINUOUS THROUGH CONSTRUCTION JOINTS.

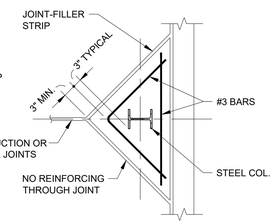


SAWED CONTRACTION JOINT

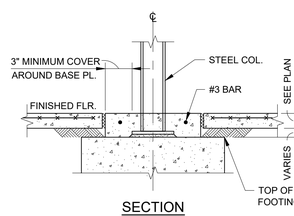
SLAB ON GROUND JOINTS



PLAN

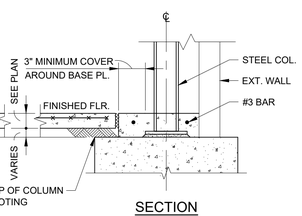


PLAN



SECTION

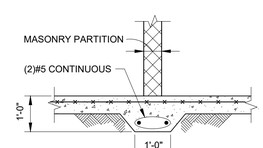
TYPICAL INTERIOR COLUMN



SECTION

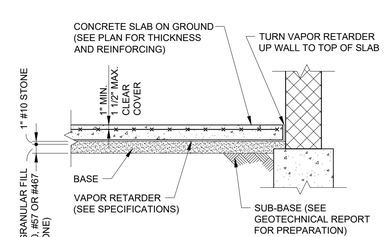
TYPICAL EXTERIOR COLUMN

SLAB ON GROUND - ISOLATION JOINTS WITH STEEL COLUMNS

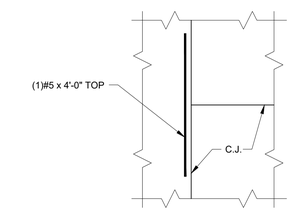


THICKENED SLAB DETAIL UNDER MASONRY PARTITIONS

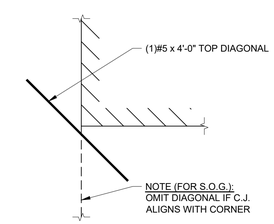
NOTE:
SEE TYPICAL SLAB ON GROUND JOINT DETAILS, SLAB REINFORCING DETAILS, AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS



SLAB ON GROUND DETAIL



AT DISCONTINUOUS JOINTS



AT INSIDE CORNERS

SLAB REINFORCING DETAILS

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2901 REGENT AVENUE NE
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RODNEY W. MEADOWS
LICENSE #6781
EXPIRATION DATE
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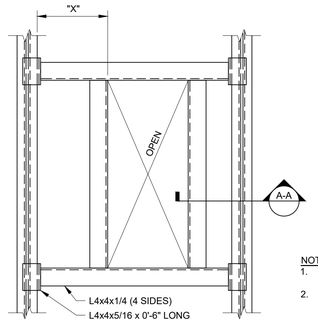
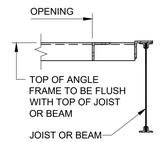


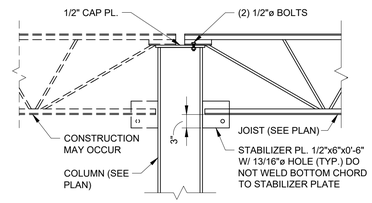
PLAN



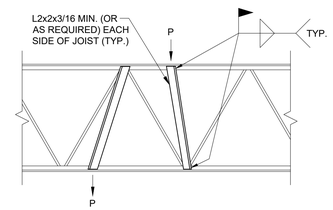
SECTION A-A

NOTES:
1. IF "X" IS 4" OR LESS, ELIMINATE ANGLE PARALLEL TO JOIST OR BEAM.
2. PROVIDE ANGLE FRAME FOR ALL OPENINGS GREATER THAN 10" DIA. OR 10" SQUARE.
3. CONTRACTOR TO VERIFY SIZE AND LOCATION OF ALL OPENINGS. SEE ARCHITECTURAL, MECHANICAL, ETC. DRAWINGS FOR OPENINGS NOT SHOWN ON STRUCTURAL DRAWINGS.

ROOF DECK OPENING DETAIL

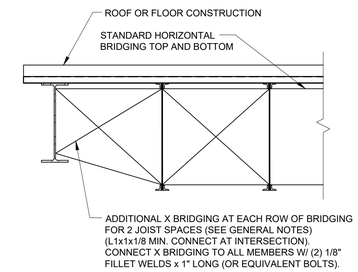


TIE JOIST DETAIL
(AT TOP OF COLUMN)

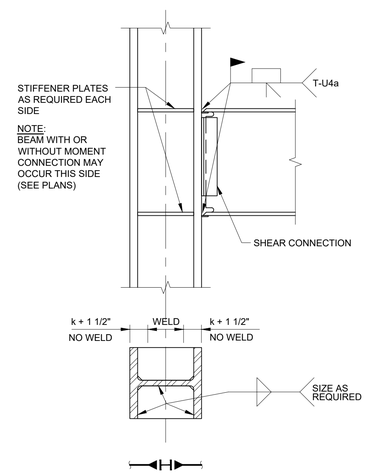


NOTE:
1. THIS DETAIL APPLIES WHERE CONCENTRATED LOADS DO NOT OCCUR AT PANEL POINTS.
2. WHERE REINFORCEMENT IS REQUIRED, LOCATE L2x2 FROM POINT OF LOAD TO THE NEAREST PANEL POINT ON THE OPPOSITE CHORD. REINFORCING ANGLES TO BE FURNISHED BY GENERAL CONTRACTOR, APPROVED BY JOIST MANUFACTURER AND INSTALLED BY JOIST CONTRACTOR.

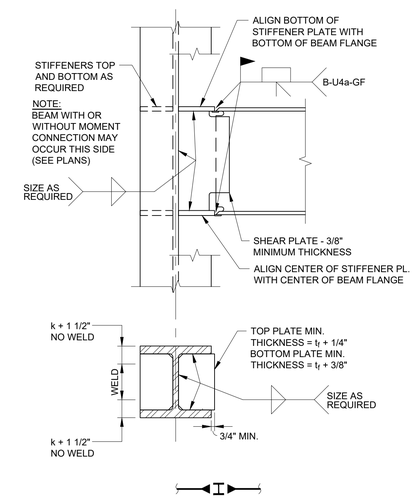
JOIST REINFORCEMENT DETAIL AT CONCENTRATED LOADS



JOIST BRIDGING AT EDGE BEAM



TYPICAL MOMENT CONNECTION DETAIL - BEAM TO COLUMN FLANGE (WELDED)



TYPICAL MOMENT CONNECTION DETAIL - BEAM TO COLUMN WEB (WELDED)

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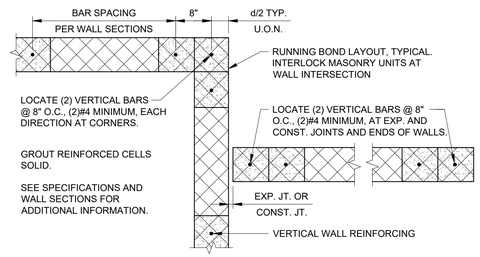
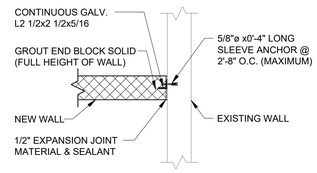
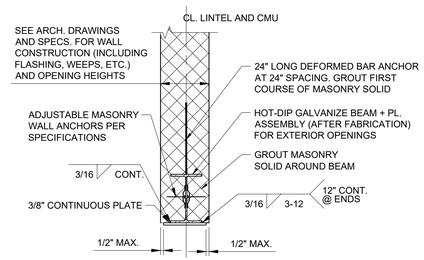


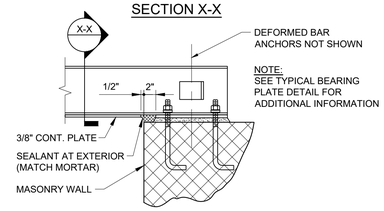
REINFORCING DETAILS FOR
CORNERS AND ENDS OF MASONRY WALLS



CONNECTION DETAIL - NEW
MASONRY WALL TO EXISTING

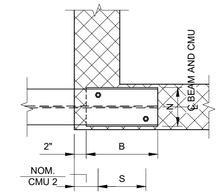


SECTION X-X

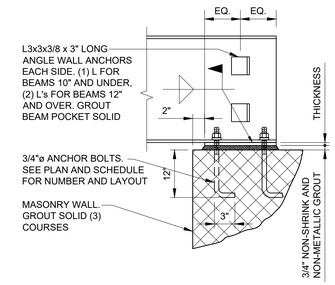


ELEVATION

TYPICAL WIDE FLANGE LINTEL
W/ BOTTOM PLATE DETAIL



PLAN DETAIL
(PARALLEL TO WALL)

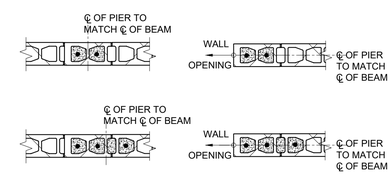


ELEVATION DETAIL
(PARALLEL TO WALL)

TYPICAL BEAM BEARING PLATE DETAILS

BEARING PLATE SCHEDULE (SIZE & REINFORCING)				
MARK	SIZE (THICKNESSxNxB)	# ANCHORS	(S)	MASONRY PIER REINFORCING*
BP-1	1/2"x7"x1'-0"	(2)	8"±	TYPICAL WALL REINFORCING

* GROUT REINFORCED CELLS SOLID FOR FULL HEIGHT OF WALL -TYPICAL



CMU WALL PIER REINFORCING
DETAILS UNDER BEARING PLATES
(FULL HEIGHT OF CMU WALL BELOW PLATE U.O.N. IN PLAN)

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PLUMBING SYMBOLS

SYMBOL	DESCRIPTION
	CALIBRATED MANUAL BALANCING VALVE
BFP	BACKFLOW PREVENTER
	CHECK VALVE
	PRESSURE REDUCING VALVE
	SHUT OFF VALVE
	STRAINER
	UNION
	EXISTING PIPING
	EXISTING PIPING TO BE REMOVED
	EXISTING FIXTURES & EQUIPMENT TO BE REMOVED
	REMOVE TO POINT AND CAP
	REMOVE TO POINT FOR RECONNECTION
CO	CLEANOUT IN FLOOR OR AT GRADE
CO	CLEANOUT IN SUSPENDED PIPE
CO	CLEANOUT IN WALL
	FLOOR DRAIN / FLOOR SINK
	TRAP SERVING DRAIN ABOVE
	PIPE BRANCH TAKE-OFF FROM BOTTOM
	PIPE BRANCH TAKE-OFF FROM TOP
	PIPE DROP
	PIPE RISE
V	VENT THRU ROOF
	HOSE BIB / FROSTPROOF HYDRANT
	PRESSURE GAUGE
	TEMPERATURE AND PRESSURE RELIEF VALVE
	THERMOMETER

GENERAL PLUMBING ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
CB	CATCH BASIN
CDV	COMBINATION DRAIN AND VENT
CTE	CONNECT TO EXISTING
DS	DOWNSPOUT (BUILDING EXTERIOR)
DV	DRAIN VALVE
EC	ELECTRICAL CONTRACTOR
EL	ELEVATION
ESE	EMERGENCY SHOWER/EYEWASH
ETR	EXISTING TO REMAIN
FPC	FIRE PROTECTION CONTRACTOR
GC	GENERAL CONTRACTOR
INV	INVERT
MB	MOP BASIN
MC	MECHANICAL CONTRACTOR
PC	PLUMBING CONTRACTOR
PVC	POLYVINYL CHLORIDE
REX	REMOVE EXISTING
RR	REMOVE AND RELOCATE
S	SINK
TMV	THERMOSTATIC MIXING VALVE
TMV-E	EMERGENCY THERMOSTATIC MIXING VALVE
TYP	TYPICAL
VS	VENT STACK
WC	WATER CLOSET
WS	WASTE STACK

DRAWING LIST - PLUMBING

NUMBER	NAME
P-0.1	PLUMBING LEGEND, SCHEDULES, AND GENERAL NOTES
PD-1.2	OFFICE AREA PLUMBING DEMOLITION PLAN
P-1.0	OVERALL PLUMBING PLAN
P-1.1	GARAGE PLUMBING PLAN
P-1.2	OFFICE AREA PLUMBING PLAN
P-6.1	PLUMBING DETAILS AND DIAGRAMS
P-6.2	PLUMBING DETAILS AND DIAGRAMS

PLUMBING PIPE SYSTEM ABBREVIATIONS

ABBREVIATION	LINETYPE	DESCRIPTION
CA		COMPRESSED AIR PIPING
CW		COLD WATER PIPING
CW		COLD WATER PIPING (UNDERGROUND/UNDERFLOOR)
G		NATURAL GAS PIPING
G		NATURAL GAS PIPING (UNDERGROUND/UNDERFLOOR)
HW		HOT WATER PIPING
RHW		RECIRCULATED HOT WATER PIPING
SAN		SANITARY SEWER (ABOVE GROUND)
SAN		SANITARY SEWER (UNDERGROUND/UNDERFLOOR)
TW		TEMPERED WATER PIPING
V		SANITARY VENT PIPING

PLUMBING ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AC	AIR COMPRESSOR
CO	CLEANOUT
DWH	DOMESTIC WATER HEATER
ESE	EMERGENCY SHOWER/EYEWASH
ET	EXPANSION TANK
ETMV	THERMOSTATIC MIXING VALVE FOR EMERGENCY USE
FPWH	FROSTPROOF WALL HYDRANT
FS	FLOOR SINK
GD	GARAGE DRAIN
HB	HOSE BIBB
MB	MOP BASIN
OI	OIL INTERCEPTOR
RHWP	RECIRCULATING HOT WATER PUMP
TMV	TEMPERATURE MIXING VALVE
TP	TRAP PRIMER

PLUMBING PIPE INSULATION SCHEDULE

SERVICE	TYPE	THICKNESS TYPE
COLD WATER	FIBERGLASS	A
HOT WATER	FIBERGLASS	B
RECIRCULATING HOT WATER	FIBERGLASS	B

THICKNESS SCHEDULE TYPE	PIPE SIZES (INCHES)				
	3/4 AND BELOW	1 TO 1-1/4	1-1/2 TO 3	4 TO 6	8 AND ABOVE
A	1/2	1/2	1	1	1
B	1	1	1-1/2	1-1/2	1-1/2
C	1-1/2	1-1/2	2	2	2
D	1/2	1/2	1/2	1/2	1/2
E	1	1	1	1	1

NOTES:
1. FOR ABOVE GROUND SANITARY CARRYING ONLY AC CONDENSATE OR ICE MACHINE DRAINAGE, PROVIDE INSULATION FROM FLOOR DRAIN OR INDIRECT WASTE RECEPTOR UNTIL PIPE IS TIED INTO SANITARY CARRYING WASTE FROM OTHER SOURCES.

OIL INTERCEPTOR SCHEDULE

EQUIPMENT TAG ABBREV.	EQUIPMENT TAG MARK	TYPE	UNIT CAPACITY (GALLONS)	INLET CONNECTION (INCHES)	OUTLET CONNECTION (INCHES)	VENT CONNECTION SIZE (INCHES)	UNIT DIMENSIONS LxWxH	CONSTRUCTION MATERIAL	MANUFACTURER
OI	1	GRAVITY	104	6	6	4	9' x 5' x 6'-6"	CONCRETE	MACK INDUSTRIES

NOTES:
A. ADJUSTABLE RISER/COVER TO MATCH FINISHED FLOOR. FIELD VERIFY REQUIRED RISER HEIGHT.
B. TRAFFIC RATED INSTALLATION INCLUDING SURROUNDING PAD, FRAMES, AND COVERS PER MANUFACTURER'S REQUIREMENTS.
C. ANTI-BUOYANCY SLAB PER MANUFACTURER'S REQUIREMENTS.
D. REFER TO DETAIL.

FUEL GAS CONNECTED LOAD SUMMARY SCHEDULE

DESCRIPTION	MBH
NEW GAS RADIANT HEATERS	700
NEW GAS UNIT HEATERS	210
NEW FURNACE	60
NEW DOMESTIC WATER HEATER	120
EXIST. GAS RADIANT HEATERS + PRESS. WASHER	1980
EXIST. FURNACES	200
EXIST. DOMESTIC WATER HEATERS	80
MBH BEING ADDED =	1090
CFH BEING ADDED =	1090
NEW TOTAL CONNECTED MBH =	3350
NEW TOTAL CONNECTED CFH =	3350

PLUMBING FIXTURE SCHEDULE 'EMERGENCY FIXTURES'

FIXTURE TAG	TYPE	MANUFACTURER	MODEL
ESE-1	FREE STANDING	GUARDIAN	G1902P

NOTES:
A. PIPE EYEWASH DRAIN TO NEARBY FLOOR SINK.
B. PADDLE ACTIVATED EYE WASH. STAINLESS STEEL, TRIANGULAR, PULL-HANDLE ACTIVATED SHOWER.
C. FLIP TOP DUST COVERS FOR EYEWASH HEADS.
D. POWDER COATED FINISH ON GALVANIZED PIPE AND FITTINGS. COLOR TO BE SELECTED BY ARCHITECT.
E. SHOWER FLOW REGULATED TO 20 GPM.
F. ABS PLASTIC SHOWER HEAD AND BOWL.

PLUMBING FIXTURE SCHEDULE 'BASIN FIXTURES'

FIXTURE TAG	TYPE	FIXTURE OUTSIDE DIMENSIONS (IN.)	FIXTURE INSIDE DIMENSIONS (IN.)	BASIN DEPTH (IN.)	ADA COMPLIANT	MANUFACTURER	MODEL	FAUCET OPERATION	FAUCET SPREAD (IN.)	SPOUT TYPE	SPOUT LENGTH (IN.)	HANDLE TYPE	OUTLET TYPE	GALLONS PER MINUTE	DRAIN TYPE	FAUCET MANUFACTURER	FAUCET MODEL
S-1	COUNTERTOP DROP-IN	21" X 19"	18" X 14"	7.5	YES	JUST	SL-1921-A-GR	MANUAL	8"	GOOSENECK	8"	WRIST BLADE	AERATOR	1.5	CUP STRAINER	CHICAGO	786-ABCP

NOTES:
A. EXISTING GARBAGE DISPOSER TO BE REMOVED FROM EXISTING BREAK ROOM SINK AND INSTALLED AT NEW SINK LOCATION.
B. EXISTING REVERSE OSMOSIS (RO) SYSTEM TO BE REMOVED FROM EXISTING BREAK ROOM SINK AND INSTALLED AT NEW SINK LOCATION. PROVIDE A DOUBLE SUPPLY STOP ON THE COLD WATER TO FEED THE SINK AND RO SYSTEM SUPPLY.
C. PROVIDE SINK BASIN WITH ADDITIONAL HOLE FOR INSTALLATION OF RO SYSTEM'S FAUCET.
D. FAUCET SPOUT TO BE RESTRICTED SWING TYPE.

DOMESTIC WATER HEATER SCHEDULE - GAS FIRED - STORAGE

EQUIPMENT TAG ABBREV.	EQUIPMENT TAG MARK	CAPACITY GPH	CAPACITY ΔT °F	BURNER TYPE	BURNER INPUT (MBH)	MIN INPUT GAS PRESSURE (WC)	EFFICIENCY %	GAS CONNECTION SIZE (INCHES)	FLUE SIZE (INCHES)	COMBUSTION AIR SIZE (INCHES)	STORAGE (GALLONS)	MAX WORKING PRESSURE (PSIG)	WATER CONNECTIONS SIZE (INCHES)	ELECTRICAL VOLT	ELECTRICAL PH	BAS INTERFACE	WEIGHT (LBS)	MANUFACTURER	MODEL
DWH	1	138	100	CONDENSING	120	3.5	95	3/4	3	3	60	160	1-1/2	120	1	NO	1,000	AO SMITH	BTH-120

NOTES:
A. CONDENSATE NEUTRALIZATION KIT.
B. EC TO PROVIDE DEDICATED 15 AMP (MINIMUM) RECEPTABLE FOR DWH.
C. PROVIDE WITH T&P RELIEF VALVE INSTALLED.

DOMESTIC HOT WATER SYSTEM EXPANSION TANK SCHEDULE

MARK	DWH(S) SERVED	DOMESTIC HOT WATER SYSTEM VOLUME RANGE (GALLONS)	TYPE	INSTALLATION POSITION	ASME CONSTRUCTION	TANK GROSS VOLUME (GALLONS)	MAXIMUM ACCEPTABLE VOLUME (GALLONS)	CONNECTION SIZE (INCHES)	DIMENSIONS DIAMETER (IN)	DIMENSIONS HEIGHT (IN)	SHIPPING WEIGHT (LBS)	AMTROL BASE MODEL
ET-1	DWH-1	54 - 135	DIAPHRAGM	PIPE MOUNTED	NO	6.4	3.2	3/4"	12	14	17	ST-12

NOTES:
A. SUITABLE FOR POTABLE WATER USE.
B. ALTERNATIVE BLADDER TYPE INSTEAD OF DIAPHRAGM SHALL BE ACCEPTABLE PROVIDED THAT ALL CRITERIA IS MET.

GENERAL PLUMBING NOTES:

A. THE PLUMBING SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.

B. DRAWINGS ARE DIAGRAMMATIC. INDICATED POSITIONS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. EXACT EQUIPMENT LOCATIONS AND PIPING ROUTING SHALL BE SUBJECT TO BUILDING CONSTRUCTION AND INTERFERENCES WITH OTHER TRADES. WHERE THE LOCATION OF A SPECIFIC PIPE OR DEVICE IS DIMENSIONED, ITS INSTALLED LOCATION SHALL BE AS DIMENSIONED UNLESS COORDINATED OTHERWISE WITH THE ARCHITECT OR ENGINEER.

C. ALTHOUGH ATTEMPTS HAVE BEEN MADE TO IDENTIFY EXISTING EQUIPMENT LOCATIONS, PIPE ROUTING, AND SIZES WITH THE USE OF EXISTING DRAWINGS AND FIELD OBSERVATIONS, PC SHALL FIELD VERIFY EXISTING INFORMATION AND REPORT ANY DISCREPANCIES TO THE ARCHITECT OR ENGINEER. CONTRACTOR SHALL NOTE DISCREPANCIES ON THE RECORD DRAWINGS.

D. UNLESS NOTED OTHERWISE, SERVICES INDICATED AS BEING REMOVED SHALL BE REMOVED TO THE POINT INDICATED FOR RECONNECTION OR BACK TO THE MAIN, CAPPED, AND IDENTIFIED. DEAD-END PIPING IS NOT PERMITTED. REMOVE PREVIOUSLY ABANDONED PIPING, SUPPORTS, ETC ENCOUNTERED ABOVE CEILINGS.

E. THE OWNER SHALL HAVE THE OPTION OF RETAINING ANY OR ALL REMOVED FIXTURES OR EQUIPMENT FOR SALVAGE. PC SHALL DISPOSE OF FIXTURES AND EQUIPMENT NOT RETAINED BY THE OWNER.

F. WHERE WORK OCCURS OUTSIDE THE PROJECT SCOPE BOUNDARY, THE CONTRACTOR PERFORMING THE WORK SHALL BE RESPONSIBLE FOR THE REMOVAL AND REINSTALLATION OF CEILINGS, GRIDS, AND LIGHTS AS REQUIRED TO PERFORM THE WORK.

G. CUTTING AND PATCHING OF WALLS AND FLOORS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION. IF THE PC DEFACES OR DAMAGES WALLS, CEILINGS, FLOORS, OR FINISHES, THE PC SHALL BE RESPONSIBLE FOR PATCHING, REPAIRING, AND REFINISHING. PATCHING MATERIALS SHALL MATCH THE EXISTING OR NEW CONDITIONS AS APPLICABLE. FINISH PAINTING SHALL BE BY THE GENERAL CONTRACTOR.

H. PROVIDE FIRESTOPPING AT PENETRATIONS OF FIRE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF FIRE-RATED ASSEMBLIES. FIRE-STOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

I. EXCEPT FOR SLAB ON GRADE, PROVIDE FIRESTOPPING AT PENETRATIONS OF NON-FIRE-RATED FLOORS. FIRESTOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

J. WHERE PIPES ARE REMOVED THROUGH FIRE-RATED FLOORS OR WALLS, THE CONTRACTOR REMOVING THE DEVICE/MATERIAL SHALL SEAL THE REMAINING OPENING TO MAINTAIN FIRE RATING.

K. PROVIDE FILLING AND SEALING OF THE AREA AROUND PENETRATIONS OF SMOKE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF SMOKE-RATED ASSEMBLIES. MATERIALS USED SHALL BE COMPATIBLE WITH THE ASSEMBLY BEING PENETRATED.

L. INSTALL EQUIPMENT REQUIRING AN ELECTRICAL CONNECTION IN SUCH A MANNER SO THAT PROPER CLEARANCE IS PROVIDED FOR SERVICING PER THE NATIONAL ELECTRIC CODE.

M. PROVIDE ROOFING WORK WHERE THE INSTALLATION OF PLUMBING EQUIPMENT OR PIPING PENETRATES OR DAMAGES AN EXISTING ROOF MEMBRANE. EXISTING ROOF WARRANTIES SHALL BE MAINTAINED. COORDINATE ROOF PENETRATIONS WITH THE ARCHITECT.

N. EQUIPMENT LAYOUT IS BASED ON SCHEDULED EQUIPMENT. ACTUAL INSTALLED EQUIPMENT SIZE, CONFIGURATION, AND PIPING CONNECTIONS SHALL BE COORDINATED WITH THE BUILDING AND PIPING LAYOUT.

O. VALVES SHALL BE ACCESSIBLE. IF LOCATED ABOVE DRYWALL CEILING OR BEHIND FINISHED WALL, PROVIDE AN ACCESS DOOR. COORDINATE ACCESS DOOR LOCATIONS WITH ARCHITECT.

P. PLUMBING SYSTEM PIPING SHALL NOT BE INSTALLED IN ELECTRICAL ROOMS, OR INFORMATION TECHNOLOGY (LOW VOLTAGE) ROOMS.

Q. DO NOT SUPPORT PIPING FROM ANOTHER PIPE, DUCT, OR CONDUIT. DO NOT SUPPORT ANY ITEM FROM METAL ROOF DECK.

R. NO EXPOSED PIPING SHALL BE INSTALLED BELOW 7'-6" IN AN EGRESS CORRIDOR.

S. ATTENTION IS CALLED TO THE LIMITED CEILING SPACE. COORDINATE ALL WORK WITH CEILING HEIGHTS, SOFFITS, STRUCTURE, DUCTWORK, AND LIGHTS. HOLD SUSPENDED SANITARY PIPING HIGH AS POSSIBLE, TO DECK BETWEEN BEAMS IF REQUIRED, AND TIGHT TO STRUCTURE. PROVIDE ANY AND ALL OFFSETS AND EFFORT REQUIRED TO FACILITATE DUCT ROUTING AND THE INSTALLATION OF OTHER EQUIPMENT AND SYSTEMS. COORDINATE CLOSELY WITH OTHER TRADES.

T. REFER TO ARCHITECTURAL INTERIOR ELEVATIONS FOR EXACT LOCATIONS AND MOUNTING HEIGHTS OF PLUMBING FIXTURES.

U. ATTENTION IS CALLED TO ROUGH-IN REQUIREMENTS FOR FIXTURES INSTALLED IN CASEWORK FURNISHED BY ANOTHER DIVISION. PROVIDE ROUGH-INS OUT OF WALL WITH ENOUGH LENGTH TO ALLOW FOR SUPPLY STOPS AND WASTES TO HAVE ESCUTCHEONS AT THE REAR BACKING OF THE CASEWORK AND NOT AT THE WALL ACCESSIBLE THROUGH FIELD CUT HOLES IN THE CASEWORK BACKING.

V. UNLESS NOTED OTHERWISE VERTICAL PIPING DROPS TO FIXTURES, HOSE BIBS, FAUCETS, ETC. SHALL BE CONCEALED IN THE WALL.

W. INSTALLATION OF WATER AND/OR DRAIN PIPING IN EXTERIOR BUILDING WALLS SHOULD BE AVOIDED. HOWEVER, IF NECESSARY, INSTALL PIPING ON INTERIOR SIDE OF WALL INSULATION WITH CONTINUOUS FULL THICKNESS PIPE INSULATION APPLIED TO ALL PORTIONS OF WATER PIPING.

X. DO NOT INSTALL WATER AND/OR DRAIN PIPING IN AREAS SUBJECT TO FREEZING. CONTRACTOR SHALL CHECK FINAL INSTALLATION AND REPORT ANY SUSPECT CONDITIONS WHERE FREEZING MAY OCCUR TO CONSTRUCTION MANAGER AND/OR ARCHITECT/ENGINEER.

Y. NEW POTABLE WATER PIPING SHALL BE CLEANED AND DISINFECTED PER THE SPECIFICATIONS PRIOR TO TIE-IN TO EXISTING POTABLE WATER SYSTEM. INSTALL VALVES AND FITTINGS AS REQUIRED TO ACCOMPLISH THE PROCESS. CLEANING AND DISINFECTING SHALL BE DOCUMENTED AND SUBMITTED BY THE PLUMBING CONTRACTOR. DOCUMENTATION SHALL BE INCLUDED IN THE OPERATING AND MAINTENANCE MANUAL.

Z. BULLHEAD PIPING CONFIGURATIONS IN WATER PIPING ARE PROHIBITED.

AA. INLINE CHECK VALVES ARE REQUIRED AT CW AND HW CONNECTIONS TO MOP BASINS AND SERVICE SINKS.

BB. INVERT ELEVATIONS NOTED ARE FROM TOP OF SLAB. MINIMUM STARTING SANITARY INVERT FOR ANY LATERAL BRANCH DRAIN SHALL BE 1'-6" BELOW TOP OF SLAB.

CC. SANITARY STACKS AND VENT STACKS SHALL BE INSTALLED TIGHT TO STRUCTURE AT LOCATIONS DROPPING ALONG SIDE COLUMNS, CORNERS, ETC.

DD. PROVIDE CLEAN-OUTS AT BASES OF AND AT HORIZONTAL OFFSETS OF SANITARY STACKS.

EE. INDIRECT DRAINS AND PUMPED DISCHARGE TERMINATIONS SHALL HAVE A 45 DEGREE ANGLE CUT AT OUTLET.

FF. THE MINIMUM UNDER SLAB SANITARY DRAIN PIPE SIZE SHALL BE 3" UNLESS OTHERWISE REQUIRED TO BE LARGER BY LOCAL CODE OR ORDINANCE.

GG. REFER TO INDIVIDUAL STACK DIAGRAMS FOR WASTE AND VENT PIPING RUN WITHIN WALLS/CHASES, AND FOR ANY PIPE SIZING NOT INDICATED ON PLANS FOR DRAWING CLARITY. REFER TO THE PLUMBING FIXTURE CONNECTION SCHEDULE FOR TYPCIAL FIXTURE WASTE AND VENT PIPE SIZING.

HH. 2-1/2" VENT PIPING INDICATED COMPLIES WITH THE PLUMBING CODE, HOWEVER, 3" MAY BE SUBSTITUTED DUE TO NON-AVAILABILITY.

II. PLUMBING VENT TERMINATIONS SHALL BE LOCATED AT LEAST 10 FEET FROM HVAC EQUIPMENT OUTSIDE AIR INTAKES.

JJ. WHERE A FLOOR DRAIN OR FLOOR SINK IS INSTALLED ADJACENT TO EQUIPMENT FOR DRAINING PURPOSES, ITS EXACT LOCATION SHALL BE COORDINATED IN THE FIELD WITH THE EQUIPMENT TO BE INSTALLED. EXACT ELEVATIONS OF FLOOR DRAINS OR FLOOR SINKS SHALL BE COORDINATED IN THE FIELD WITH FINISHED FLOOR LEVELS AND SLOPES.

KK. FLOOR DRAINS SHALL HAVE TRAP PRIMERS EXCEPT FOR THOSE RECEIVING A CONTINUOUS WATER SOURCE.

LL. COVER FLOOR DRAINS AND FLOOR SINKS DURING CONSTRUCTION TO PREVENT DEBRIS FROM ENTERING PIPE AND TO PROTECT GRATES FROM DAMAGE.

MM. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOW VOLTAGE WIRING REQUIRED FOR PROPER OPERATION OF HARDWIRED PLUMBING FIXTURES. ALL WIRING SHALL BE INSTALLED IN CONDUIT PER DIVISION 26 REQUIREMENTS.

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THIS DWG :
PLUMBING LEGEND, SCHEDULES, AND GENERAL NOTES

COMM 17186
DATE 02-24-2022

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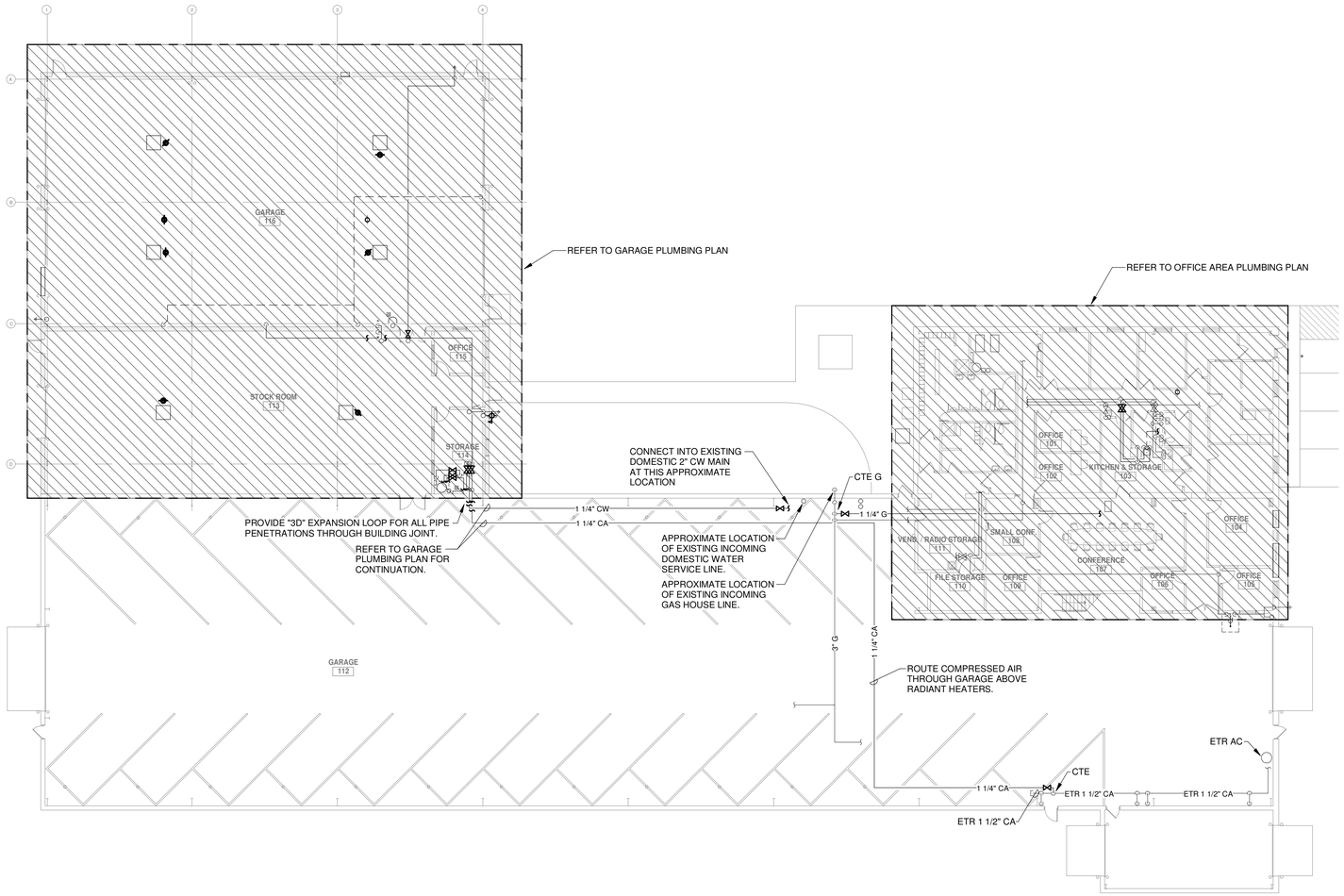

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OVERALL PLUMBING PLAN

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SCALE: 1/16" = 1'-0"
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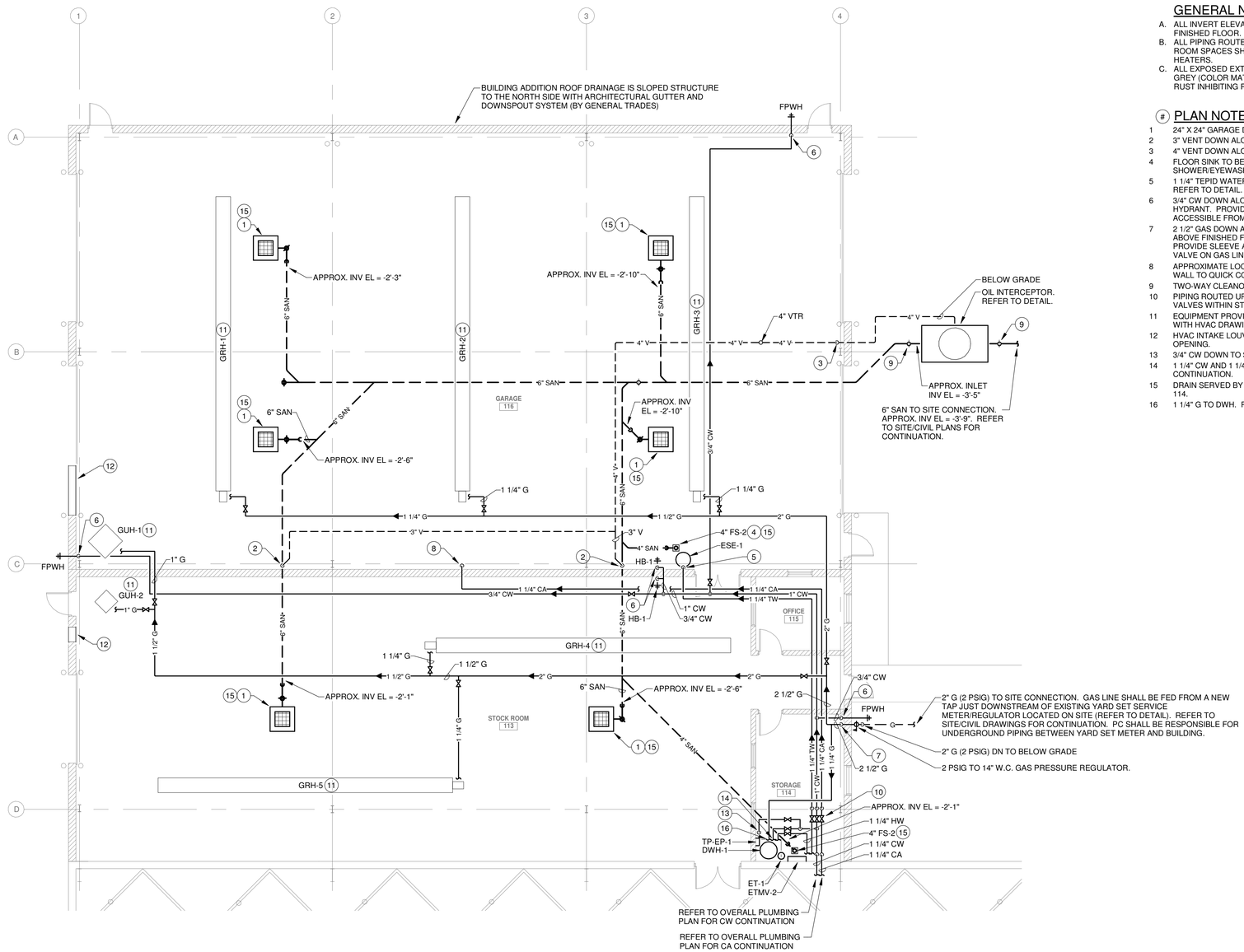
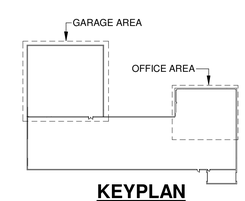


GENERAL NOTES:

A. ALL INVERT ELEVATIONS (INV EL) INDICATED ARE FROM FIRST FLOOR FINISHED FLOOR.
B. ALL PIPING ROUTED HORIZONTALLY THROUGH GARAGE AND STOCK ROOM SPACES SHALL BE INSTALLED ABOVE THE GAS RADIANT HEATERS.
C. ALL EXPOSED EXTERIOR GAS PIPING AT GRADE SHALL BE PAINTED GREY (COLOR MATCHING GAS UTILITY PROVIDER'S STANDARDS) WITH RUST INHIBITING PAINT.

PLAN NOTES

1. 24" X 24" GARAGE DRAIN WITH 6" OUTLET. REFER TO DETAIL.
2. 3" VENT DOWN ALONG WALL, EXPOSED, TO BELOW GRADE.
3. 4" VENT DOWN ALONG WALL, EXPOSED, TO BELOW GRADE.
4. FLOOR SINK TO BE INSTALLED BENEATH EMERGENCY SHOWER/EYEWASH (CLOSE TO WALL). REFER TO DETAIL.
5. 1 1/4" TEPID WATER DOWN TO EMERGENCY SHOWER/EYEWASH. REFER TO DETAIL.
6. 3/4" CW DOWN ALONG WALL, EXPOSED, TO SERVE HOSE BIBB/WALL HYDRANT. PROVIDE SHUT-OFF VALVE IN CW LINE THAT IS EASILY ACCESSIBLE FROM THE FLOOR.
7. 2 1/2" GAS DOWN ALONG WALL, EXPOSED, TO APPROXIMATELY 2'-0" ABOVE FINISHED FLOOR FOR EXTERIOR WALL PENETRATION. PROVIDE SLEEVE AND SEAL WATER TIGHT. PROVIDE A SHUT-OFF VALVE ON GAS LINE EASILY ACCESSIBLE FROM THE FLOOR.
8. APPROXIMATE LOCATION OF COMPRESSED AIR DROP DOWN ALONG WALL TO QUICK CONNECT. REFER TO DETAIL FOR INFORMATION.
9. TWO-WAY CLEANOUT AT GRADE.
10. PIPING ROUTED UP/DOWN TO APPROXIMATELY 9'-6" FOR ACCESS TO VALVES WITHIN STORAGE ROOM 114.
11. EQUIPMENT PROVIDED BY MECHANICAL CONTRACTOR. COORDINATE WITH HVAC DRAWINGS.
12. HVAC INTAKE LOUVER. DO NOT ROUTE ANY PIPING IN FRONT OF OPENING.
13. 3/4" CW DOWN TO SERVE TRAP PRIMER. REFER TO DETAIL.
14. 1 1/4" CW AND 1 1/4" HW TO/FROM DWH. REFER TO DETAIL FOR CONTINUATION.
15. DRAIN SERVED BY ELECTRONIC TRAP PRIMER LOCATED IN STORAGE 114.
16. 1 1/4" G TO DWH. REFER TO DETAIL FOR CONTINUATION.



KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
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GARAGE PLUMBING PLAN

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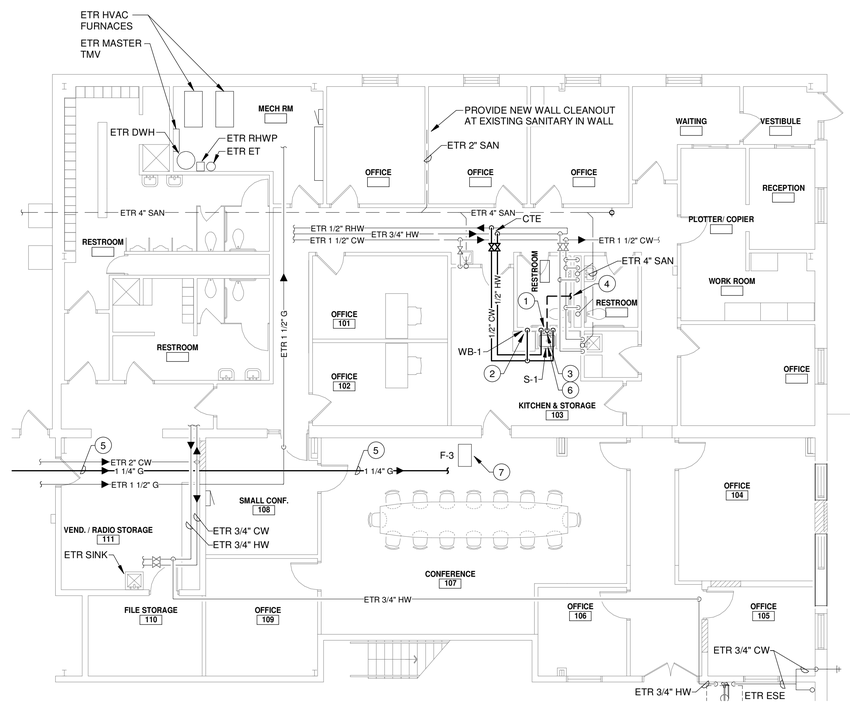
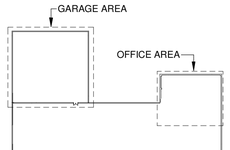
PLAN NOTES

1. 1/2" HW, 1/2" CW, AND 1 1/2" VENT DOWN TO SERVE SINK.
2. 1/2" CW DOWN TO SERVE WALL BOX SERVING REFRIGERATOR. REFER TO DETAIL.
3. ROUTE 1 1/2" SAN WITHIN WALL OVER TO EXISTING RESTROOM CHASE AND CONNECT TO EXISTING 4" SAN ABOVE FLOOR WITHIN CHASE.
4. ROUTE VENT ABOVE CEILING OVER TO CHASE AND CTE 2" VENT WITHIN CHASE.
5. GAS PIPING TO SERVE HVAC FURNACE LOCATED IN MEZZANINE ABOVE. PIPING SHOWN SHALL BE ROUTED HIGH ACROSS MEZZANINE LEVEL.
6. INSTALL EXISTING REVERSE OSMOSIS SYSTEM AND GARBAGE DISPOSER WITHIN SINK BASE CABINET (BOTH WERE REMOVED FROM EXISTING KITCHEN SINK IN DEMOLITION PHASE). REFER TO SINK SCHEDULE FOR FURTHER INFORMATION.
7. HVAC FURNACE SHALL BE LOCATED IN MEZZANINE ABOVE.





KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

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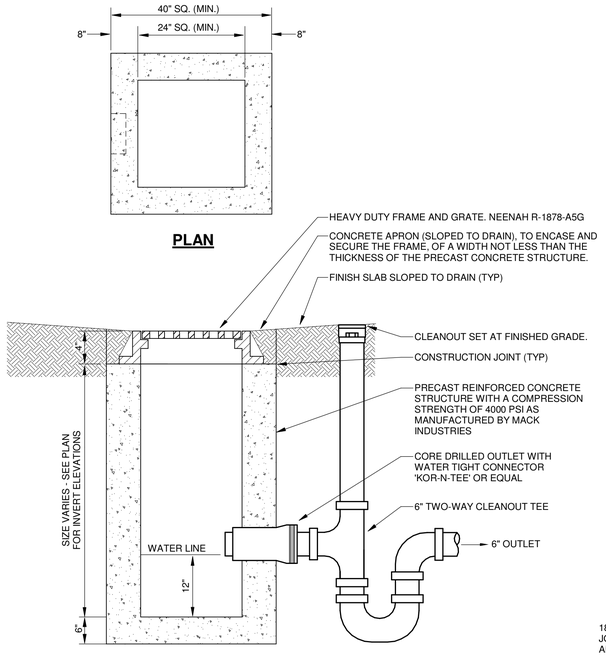
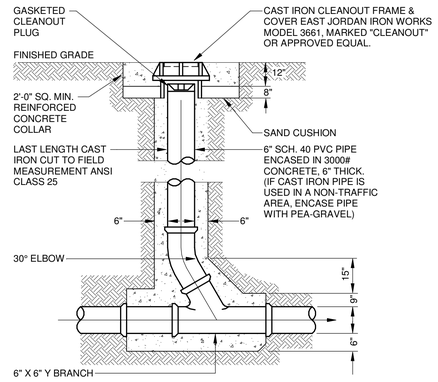


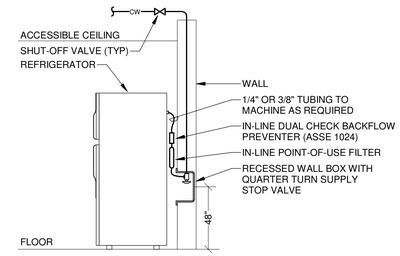
NOTES:
1. RATED FOR H-20 LOADING.
2. 6" TRAP TO BE PRIMED VIA TRAP PRIMER. REFER TO FLOOR PLANS FOR LOCATION OF PRIMER.

GARAGE DRAIN
SCALE: NONE



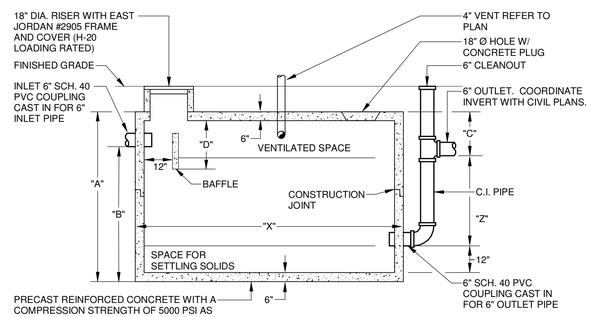
NOTES:
1. IF C.I. PIPE IS USED - CONCRETE ENCASEMENT IS NOT NECESSARY UNLESS CLEANOUT IS IN A TRAFFIC AREA.

INSIDE AND OUTSIDE 6" CLEANOUT DETAIL
SCALE: NONE



NOTE:
1. REFRIGERATORS EQUIPPED WITH INTEGRAL FILTERS DO NOT REQUIRE EXTERNAL PIPED FILTER.
2. PROVIDE PRESSURE REGULATING VALVE AS REQUIRED TO MEET EQUIPMENT MANUFACTURER'S ACCEPTABLE PRESSURE RANGE.

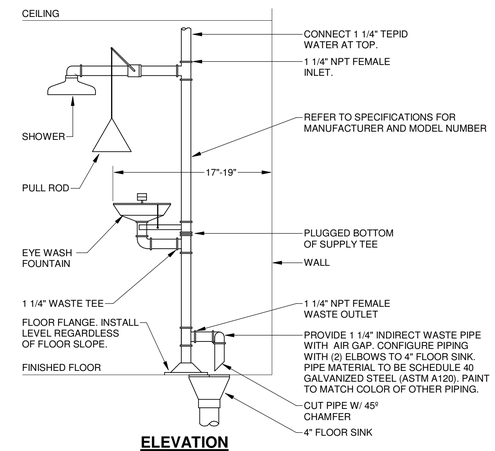
REFRIGERATOR WITH ICE MAKER PIPING DIAGRAM
SCALE: NONE



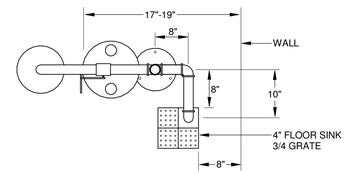
DIMENSIONAL PARAMETERS						
CAPACITY (CUB FT)	"A"	"B"	"C"	"X"	"Y"	"Z"
104	6'-6"	5'-1"	1'-9"	9'-0"	5'-0"	3'-3"

NOTES:
1. PROVIDE 6" THICK 3000 PSI REINFORCED CONCRETE PAD (H-20 LOADING) .
2. 6" INLET AND OUTLET.
3. "Y" REFERS TO THE WIDTH OF THE OIL INTERCEPTOR.
4. CONSTRUCTION JOINT SEAL WITH 1" CONSEAL CS-440 OIL RESISTANT SEALANT.

OIL INTERCEPTOR DETAIL
TRAFFIC BEARING SCALE: NONE

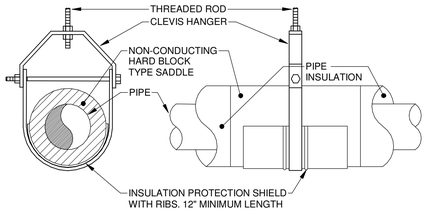


ELEVATION



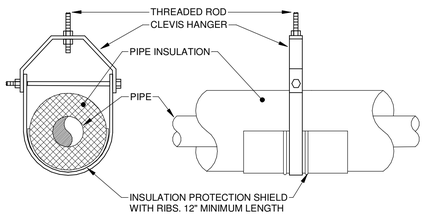
PLAN

EMERGENCY SHOWER & EYE WASH STATION DETAIL
SCALE: NONE



NOTES:
1. WHEN INSTALLED USING A TRAPEZE HANGER OR OTHER TYPE OF SUPPORT, LOCATE HANGER OR SUPPORT, PIPE CLAMP, INSULATION PROTECTION SHIELD AND SADDLE IN SAME LOCATION AS CLEVIS HANGER.
2. INSULATION PROTECTION SHIELD DIAMETER SHALL MATCH INSULATION OUTSIDE DIAMETER.
3. SADDLE LENGTH SHALL MATCH PROTECTION SHIELD LENGTH. THICKNESS SHALL MATCH PIPE INSULATION THICKNESS.
4. INSULATION SYSTEM SHALL BE CONTINUOUS THROUGH HANGER WITH VAPOR SEAL INTEGRITY MAINTAINED THROUGHOUT THE ENTIRE SYSTEM. APPLY TAPE TO ALL JOINTS.

FIBERGLASS INSULATION - PIPING 2 1/2" AND LARGER
FOR PIPING SYSTEMS WITH A POSSIBILITY OF CONDENSATION

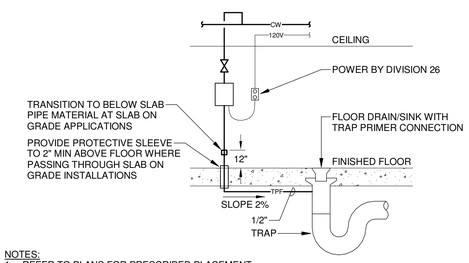


NOTES:
1. WHEN INSTALLED USING A TRAPEZE HANGER OR OTHER TYPE OF SUPPORT, LOCATE HANGER OR SUPPORT, PIPE CLAMP AND PROTECTION SHIELD IN SAME LOCATION AS CLEVIS HANGER.
2. INSULATION PROTECTION SHIELD DIAMETER SHALL MATCH INSULATION OUTSIDE DIAMETER.
3. INSULATION SYSTEM SHALL BE CONTINUOUS THROUGH SHALL BE CONTINUOUS THROUGH HANGER WITH VAPOR SEAL INTEGRITY MAINTAINED THROUGHOUT THE ENTIRE SYSTEM.

FIBERGLASS INSULATION - PIPING 2" AND SMALLER

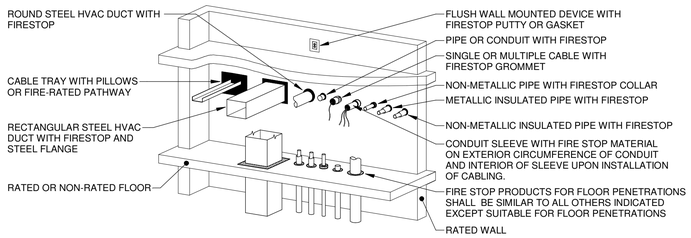
NOTE:
ALL ABOVE DETAILS MAY NOT APPLY TO THE PROJECT. PIPE INSULATION TYPE AND PIPE SIZE SHALL DETERMINE WHICH DETAILS APPLY. REFER TO SPECIFICATIONS.

PLUMBING - INSULATED PIPE HANGER DETAILS
SCALE: NONE



NOTES:
1. REFER TO PLANS FOR PRESCRIBED PLACEMENT.
2. PC SHALL MANUALLY PRIME ALL TRAPS AND FEED TUBING PRIOR TO COMPLETION OF PROJECT.
3. ALL FEED TUBING SHALL BE PITCHED 2% MIN TO FLOOR DRAINS AND RUN WITHOUT SAGGING.
4. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.
5. PROVIDE DISTRIBUTION UNIT(S) FOR SERVING MULTIPLE FLOOR DRAIN TRAPS OF SUITABLE MODELS.
6. FOR EXPOSED UNIT INSTALLATIONS IN ROOMS WITHOUT CEILINGS. INSTALL 66" AFF MINIMUM IN MECHANICAL ROOMS AND 84" AFF IN JANITOR'S CLOSETS.
7. PC TO COORDINATE ELECTRICAL ROUGH-IN WITH EC FOR ELECTRICALLY ACTIVATED UNITS.
8. ELECTRICAL UNITS TO BE INSTALLED EXPOSED WITHIN MECHANICAL SPACES

TRAP PRIMER DETAIL - ELECTRIC TYPE
SCALE: NONE



NOTES:
1. REFER TO UL FIRE RESISTANCE DIRECTORY FOR COMPLETE INSTALLATION REQUIREMENTS.
2. IN AN OCCUPIED BUILDING, PERMANENT FIRESTOPPING SHALL BE INSTALLED WITHIN 24 HOURS OF PENETRATING A FIRE-RATED ASSEMBLY. IF PERMANENT FIRESTOPPING CANNOT BE INSTALLED WITHIN THIS TIME PERIOD, TEMPORARY FIRESTOP PILLOWS/ BLOCKS ARE PERMITTED, WHERE INSTALLATION ALLOWS, UNTIL PERMANENT FIRESTOP MATERIALS CAN BE PROPERLY INSTALLED.

FIRESTOPPING DETAIL
SCALE: NONE

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CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING

MOTTIP & MEADOWS ARCHITECTS

STATE OF OHIO
CONOR P. ECKHARDT
E-86424
PROFESSIONAL ENGINEER

THIS DWG :
PLUMBING DETAILS AND DIAGRAMS

COMM 17186
DATE 02-24-2022

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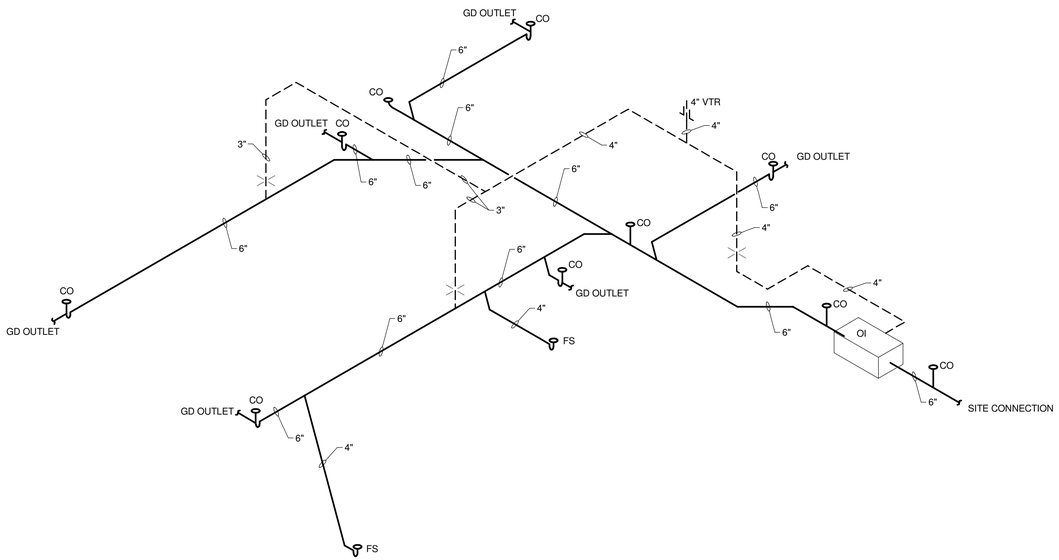
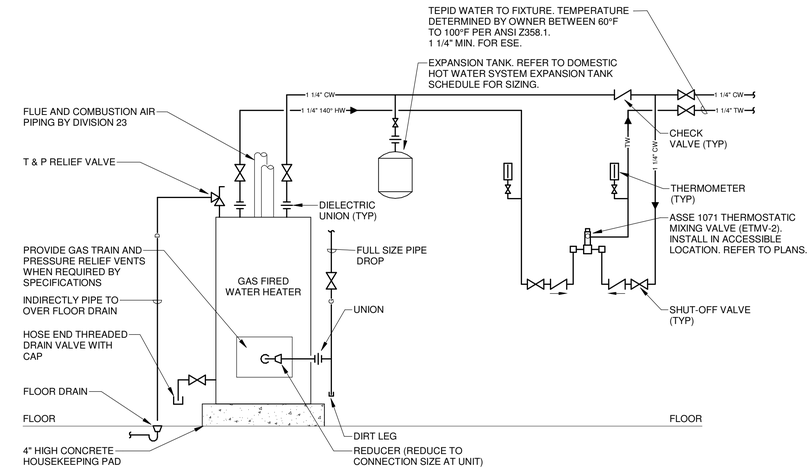


SANITARY STACK DIAGRAM

SCALE: NONE

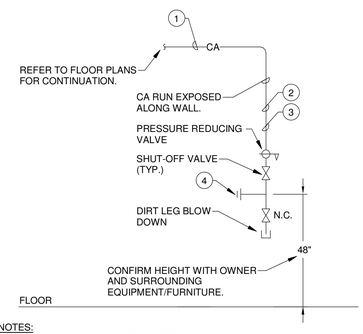


NOTES:
1. WATER HEATER CONNECTION LOCATIONS VARY PER MANUFACTURER.
2. BOTTOM FED TANK TYPE WATER HEATERS AND STORAGE TANKS SHALL BE PIPED WITH ANSI Z21.22 VACUUM RELIEF VALVE; WATTS NO. N36-M1 OR EQUIVALENT.
3. SEE PLANS FOR HOT AND COLD WATER PIPE SIZES.

GAS FIRED WATER HEATER PIPING DIAGRAM - EMERGENCY FIXTURE THERMOSTATIC MIXING VALVE

(ONE HEATER - ONE WATER TEMPERATURE, NO RHW)

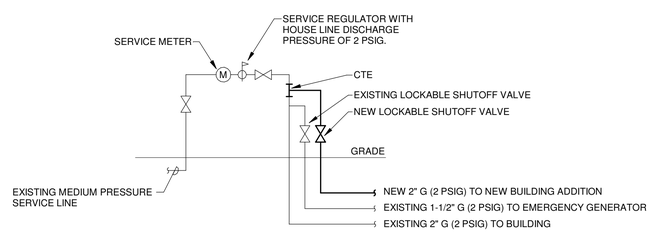
SCALE: NONE



X NOTES:
1. BRANCH PIPING SHALL BE ROUTED SUCH THAT NO TRAPS FOR WATER ARE CREATED.
2. REFER TO FLOOR PLANS FOR SPECIFIC SIZES AT DIFFERENT LOCATIONS.
3. PIPE LABEL.
4. 3/4" TEE WITH SCHRADER QUICK CONNECT FITTING PROVISION FOR OWNER CONNECTION.

COMPRESSED AIR POINT-OF-USE DETAILS

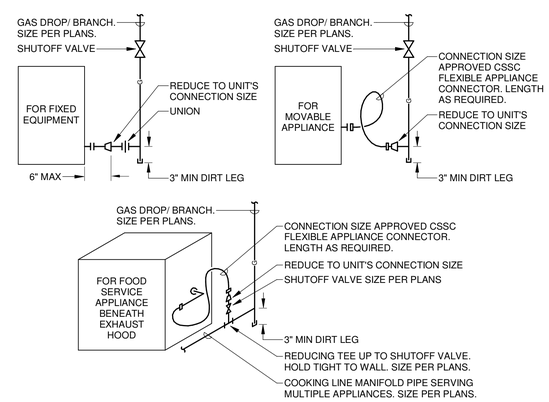
SCALE: NONE



NOTES:
1. REFER TO SITE/CIVIL PLANS FOR ROUTING OF NEW GAS PIPING TO NEW BUILDING ADDITION.

YARD SET SERVICE METER / REGULATOR DETAIL

SCALE: NONE



GAS FIRED EQUIPMENT CONNECTION DETAILS

SCALE: NONE

REVISIONS:

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MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
CONOR P. ECKHARDT
E-86424
PROFESSIONAL ENGINEER

THIS DWG :
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DATE 02-24-2022

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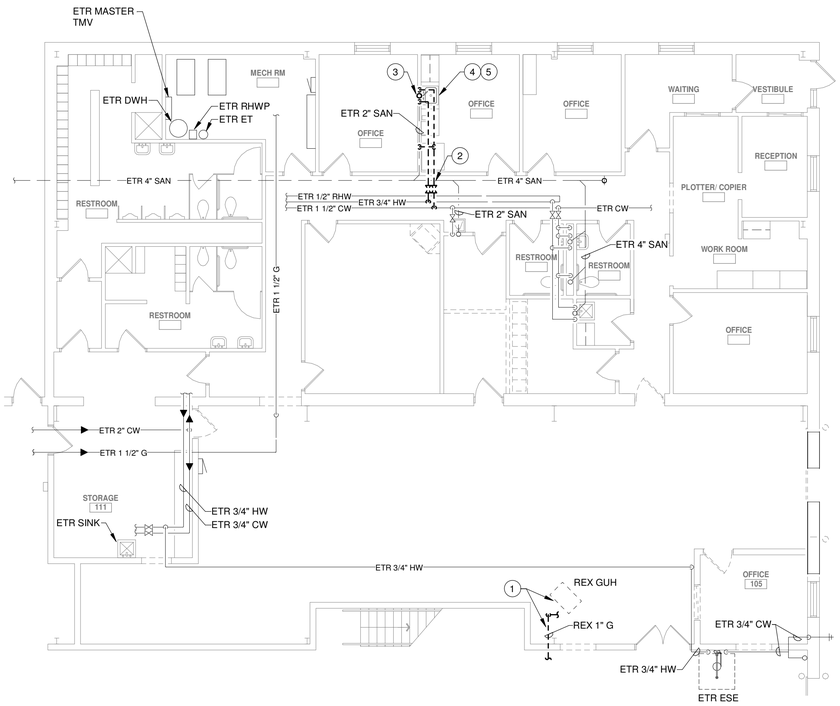
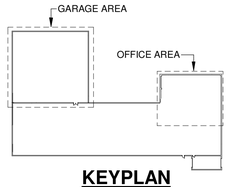
PLAN NOTES

1. REMOVE EXISTING GAS UNIT HEATER AND ALL ASSOCIATED CONTROLS, PIPING, AND FLUE/INTAKES. PIPING SHALL BE REMOVED BACK TO NEAREST ACTIVE MAIN AND CAPPED.
2. REMOVE PIPING AND ASSOCIATED VALVES BACK TO POINT INDICATED AND CAP.
3. REMOVE SANITARY PIPING SERVING FIXTURE DOWN TO FLOOR AND CAP. REMOVE VENT PIPING BACK TO NEAREST ACTIVE MAIN AND CAP.
4. REMOVE FIXTURE AND ASSOCIATED PIPING, AS SHOWN.
5. REMOVE EXISTING RO SYSTEM AND GARBAGE DISPOSER AND PREPARE THEM FOR REINSTALLATION IN NEW LOCATION. REFER TO NEW WORK PLAN FOR FURTHER INFORMATION.





KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

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MOTTER & MEADOWS ARCHITECTS

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CITY OF CANTON
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STATE OF OHIO
CONOR P. ECKHARDT
E-86424
REGISTERED PROFESSIONAL ENGINEER

THIS DWG :
OFFICE AREA PLUMBING DEMOLITION PLAN

COMM 17186
DATE 02-24-2022

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FIRE PROTECTION SYMBOLS

SYMBOL	DESCRIPTION
	EXISTING PIPING
	EXISTING PIPING TO BE REMOVED
	REMOVE TO POINT AND CAP
	REMOVE TO POINT FOR RECONNECTION
	NEW PIPING
	CHECK VALVE
TS FS	ZONE CONTROL STATION
	SHUTOFF VALVE
FS	FLOW SWITCH
TS	VALVE WITH TAMPER SWITCH
	UNION
	PIPE BRANCH TAKE-OFF FROM BOTTOM
	PIPE BRANCH TAKE-OFF FROM TOP
	PIPE DROP
	PIPE RISE
	ZONE OUTLINE
	HAZARD OUTLINE
	AREA OF WORK OUTLINE

GENERAL FIRE PROTECTION ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AFF	ABOVE FINISHED FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
CEIL	CEILING
CTE	CONNECT TO EXISTING
DV	DRAIN VALVE
EC	ELECTRICAL CONTRACTOR
EH-1	EXTRA HAZARD GROUP 1
EH-2	EXTRA HAZARD GROUP 2
ETR	EXISTING TO REMAIN
FPC	FIRE PROTECTION CONTRACTOR
FM	FACTORY MUTUAL
GC	GENERAL CONTRACTOR
IMC	INTERMEDIATE METAL CONDUIT
MC	MECHANICAL CONTRACTOR
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
PC	PLUMBING CONTRACTOR
REX	REMOVE EXISTING
RR	REMOVE AND RELOCATE
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
OH-1	ORDINARY HAZARD GROUP 1
OH-2	ORDINARY HAZARD GROUP 2

FIRE PROTECTION PIPE SYSTEM ABBREVIATIONS

ABBREVIATION	DESCRIPTION
F	FIRE PROTECTION PIPING
SPR	SPRINKLER PIPING

FIRE PROTECTION ABBREVIATIONS

ABBREVIATION	DESCRIPTION
FDC	FIRE DEPARTMENT CONNECTION
SPR	SPRINKLER

DRAWING LIST - FIRE PROTECTION

NUMBER	NAME
FP-0.1	FIRE PROTECTION LEGEND, DETAILS, AND GENERAL NOTES
FPD-1.2	OFFICE AREA FIRE PROTECTION DEMOLITION PLAN
FP-1.0	OVERALL FIRE PROTECTION PLAN

GENERAL FIRE PROTECTION NOTES:

A. THIS CONTRACT SHALL INCLUDE THE REWORKING AND/OR EXTENSION OF THE EXISTING FIRE PROTECTION SYSTEM.

B. WORK SHALL BE DESIGNED AND INSTALLED BY A STATE CERTIFIED FIRE PROTECTION SYSTEM DESIGNER/CONTRACTOR. WORK SHALL BE DESIGNED AND INSTALLED BY A COMPANY COMPLYING WITH THE QUALIFICATIONS INDICATED IN THE SPECIFICATIONS.

C. THE FIRE PROTECTION SYSTEM SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH APPLICABLE CODES, NFPA, AND THE OWNER'S INSURANCE UNDERWRITER.

D. FIRE PROTECTION SPRINKLER ZONES, POINTS OF WATER CONNECTION, SPRINKLER HEAD LOCATIONS, AND PIPE ROUTING ARE SHOWN FOR REFERENCE AND TO INDICATE THE DESIGN INTENT. INCLUDE THE INSTALLATION OF ALL COMPONENTS, CALCULATIONS, PROVISIONS, AND SYSTEM REQUIREMENTS UNIQUE TO THIS PROJECT WHETHER INDICATED OR NOT. THE SYSTEM AND ALL ITS DESIGN REQUIREMENTS SHALL BE THE RESPONSIBILITY OF THE FPC.

E. UNLESS NOTED AS A HIGHER HAZARD OCCUPANCY, ALL AREAS SHALL BE DESIGNED AS LIGHT HAZARD.

F. DRAWINGS ARE DIAGRAMMATIC. INDICATED POSITIONS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. EXACT EQUIPMENT LOCATIONS AND PIPING ROUTING SHALL BE SUBJECT TO BUILDING CONSTRUCTION AND INTERFERENCES WITH OTHER TRADES. WHERE THE LOCATION OF A SPECIFIC PIPE OR DEVICE IS DIMENSIONED, ITS INSTALLED LOCATION SHALL BE AS DIMENSIONED UNLESS COORDINATED OTHERWISE WITH THE ARCHITECT OR ENGINEER.

G. ALTHOUGH ATTEMPTS HAVE BEEN MADE TO IDENTIFY EXISTING EQUIPMENT LOCATIONS, PIPE ROUTING, AND SIZES WITH THE USE OF EXISTING DRAWINGS AND FIELD OBSERVATIONS, FPC SHALL FIELD VERIFY EXISTING INFORMATION AND REPORT ANY DISCREPANCIES TO THE ARCHITECT OR ENGINEER. CONTRACTOR SHALL NOTE DISCREPANCIES ON THE RECORD DRAWINGS.

H. UNLESS NOTED OTHERWISE, SERVICES INDICATED AS BEING REMOVED SHALL BE REMOVED TO THE POINT INDICATED FOR RECONNECTION OR BACK TO THE MAIN, CAPPED, AND IDENTIFIED. REMOVE PREVIOUSLY ABANDONED PIPING, SUPPORTS, ETC. ENCOUNTERED ABOVE CEILINGS.

I. THE OWNER SHALL HAVE THE OPTION OF RETAINING ANY OR ALL REMOVED EQUIPMENT FOR SALVAGE. FPC SHALL DISPOSE OF EQUIPMENT NOT RETAINED BY THE OWNER.

J. WHERE WORK OCCURS OUTSIDE THE PROJECT SCOPE BOUNDARY, THE CONTRACTOR PERFORMING THE WORK SHALL BE RESPONSIBLE FOR THE REMOVAL AND REINSTALLATION OF CEILINGS, GRIDS, AND LIGHTS AS REQUIRED TO PERFORM THE WORK.

K. CUTTING AND PATCHING OF WALLS AND FLOORS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION. IF THE FPC DEFACES OR DAMAGES WALLS, CEILINGS, FLOORS, OR FINISHES, THE FPC SHALL BE RESPONSIBLE FOR PATCHING, REPAIRING, AND REFINISHING. PATCHING MATERIALS SHALL MATCH THE EXISTING OR NEW CONDITIONS AS APPLICABLE. FINISH PAINTING SHALL BE BY THE GENERAL CONTRACTOR.

L. PROVIDE FIRESTOPPING AT PENETRATIONS OF FIRE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF FIRE-RATED ASSEMBLIES. FIRESTOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

M. EXCEPT FOR SLAB ON GRADE, PROVIDE FIRESTOPPING AT PENETRATIONS OF NON-FIRE-RATED FLOORS. FIRESTOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

N. WHERE PIPES ARE REMOVED THROUGH FIRE-RATED FLOORS OR WALLS, THE CONTRACTOR REMOVING THE DEVICE/MATERIAL SHALL SEAL THE REMAINING OPENING TO MAINTAIN FIRE RATING.

O. PROVIDE FILLING AND SEALING OF THE AREA AROUND PENETRATIONS OF SMOKE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF SMOKE-RATED ASSEMBLIES. MATERIALS USED SHALL BE COMPATIBLE WITH THE ASSEMBLY BEING PENETRATED.

P. INSTALL EQUIPMENT REQUIRING AN ELECTRICAL CONNECTION IN SUCH A MANNER SO THAT PROPER CLEARANCE IS PROVIDED FOR SERVICING PER THE NATIONAL ELECTRIC CODE.

Q. VALVES, SWITCHES, ETC. SHALL BE ACCESSIBLE. IF LOCATED ABOVE DRYWALL CEILING OR BEHIND FINISHED WALL, PROVIDE AN ACCESS DOOR. COORDINATE ACCESS DOOR LOCATIONS WITH ARCHITECT.

R. FIRE PROTECTION SYSTEM PIPING SHALL NOT BE ROUTED THROUGH ELECTRICAL ROOMS, OR INFORMATION TECHNOLOGY (LOW VOLTAGE) ROOMS.

S. DO NOT SUPPORT PIPING FROM ANOTHER PIPE, DUCT, OR CONDUIT. DO NOT SUPPORT ANY ITEM FROM METAL ROOF DECK.

T. NO EXPOSED PIPING SHALL BE INSTALLED BELOW 7'-6" IN AN EGRESS CORRIDOR.

U. ATTENTION IS CALLED TO THE LIMITED CEILING SPACE. COORDINATE ALL WORK WITH CEILING HEIGHTS, SOFFITS, STRUCTURE, DUCTWORK, AND LIGHTS. PROVIDE ALL EFFORT REQUIRED TO FACILITATE DUCT ROUTING AND THE INSTALLATION OF OTHER EQUIPMENT AND SYSTEMS. COORDINATE CLOSELY WITH OTHER TRADES.

V. WET SPRINKLER PIPING SHALL NOT BE INSTALLED IN AREAS SUBJECT TO FREEZING.

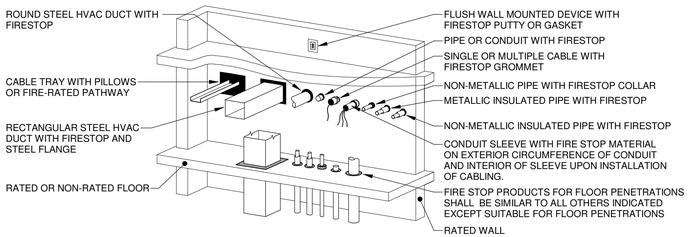
W. COORDINATE PIPE ROUTING WITH THE BUILDING STRUCTURE. BEAM PENETRATIONS ARE NOT PERMITTED.

X. THE PIPING SYSTEM SHALL BE INSTALLED WITHOUT TRAPPING OF WATER WHILE MAINTAINING REQUIRED SLOPE FOR DRAINING. DRAIN VALVES SHALL BE AVOIDED AS MUCH AS POSSIBLE, AND INSTALLED ONLY AS NECESSARY. PROVIDE OFFSETS, TRANSITIONS, AND AUXILIARY LOW POINT DRAINS AS REQUIRED TO AVOID INTERFERENCES AT NO ADDITIONAL COST TO THE PROJECT.

Y. PIPING SHALL BE CONCEALED IN AREAS WITH CEILINGS.

Z. THE DRAWINGS DO NOT SHOW ALL OF THE REQUIRED SPRINKLER HEADS. ANY HEADS SHOWN ON THE DRAWINGS ARE FOR THE PURPOSE OF SHOWING THE INTENT OF THE DESIGN WITH RESPECT TO THE ARCHITECTURAL DESIGN AND OTHER TRADES WORK. THE FPC IS ULTIMATELY RESPONSIBLE FOR THE FINAL PLACEMENT OF ALL SPRINKLER HEADS IN ACCORDANCE WITH NFPA 13.

AA. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING TYPES, CEILING HEIGHTS, AND GRID LAYOUT. SPRINKLER HEADS SHALL BE LOCATED IN THE CENTER OF CEILING TILES. WHERE A 2' X 4' CEILING TILE HAS THE APPEARANCE OF TWO 2' X 2' CEILING TILES, CENTER THE HEAD IN THE 2' X 2' SECTION.



NOTES:
1. REFER TO UL FIRE RESISTANCE DIRECTORY FOR COMPLETE INSTALLATION REQUIREMENTS.
2. IN AN OCCUPIED BUILDING, PERMANENT FIRESTOPPING SHALL BE INSTALLED WITHIN 24 HOURS OF PENETRATING A FIRE-RATED ASSEMBLY. IF PERMANENT FIRESTOPPING CANNOT BE INSTALLED WITHIN THIS TIME PERIOD, TEMPORARY FIRESTOP PILLOWS/ BLOCKS ARE PERMITTED, WHERE INSTALLATION ALLOWS, UNTIL PERMANENT FIRESTOP MATERIALS CAN BE PROPERLY INSTALLED.

FIRESTOPPING DETAIL
SCALE: NONE

REVISIONS:

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REGENT AVENUE N.E.

STATE OF OHIO
CONOR P. ECKHARDT
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THIS DWG :
FIRE PROTECTION LEGEND, DETAILS, AND GENERAL NOTES

COMM 17186
DATE 02-24-2022

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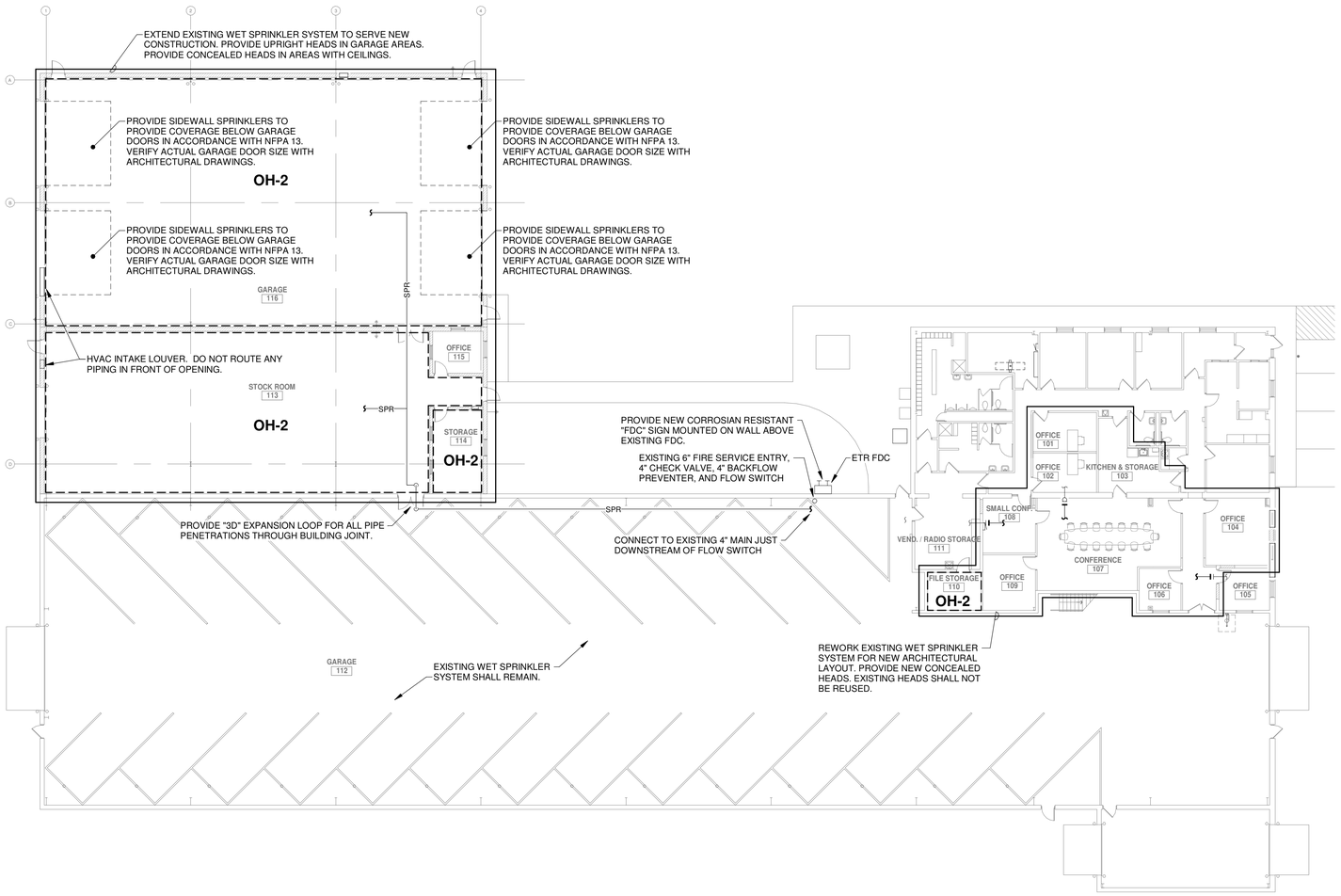

EXTEND EXISTING WET SPRINKLER SYSTEM TO SERVE NEW CONSTRUCTION. PROVIDE UPRIGHT HEADS IN GARAGE AREAS. PROVIDE CONCEALED HEADS IN AREAS WITH CEILINGS.

PROVIDE SIDEWALL SPRINKLERS TO PROVIDE COVERAGE BELOW GARAGE DOORS IN ACCORDANCE WITH NFPA 13. VERIFY ACTUAL GARAGE DOOR SIZE WITH ARCHITECTURAL DRAWINGS.

PROVIDE SIDEWALL SPRINKLERS TO PROVIDE COVERAGE BELOW GARAGE DOORS IN ACCORDANCE WITH NFPA 13. VERIFY ACTUAL GARAGE DOOR SIZE WITH ARCHITECTURAL DRAWINGS.

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PROVIDE SIDEWALL SPRINKLERS TO PROVIDE COVERAGE BELOW GARAGE DOORS IN ACCORDANCE WITH NFPA 13. VERIFY ACTUAL GARAGE DOOR SIZE WITH ARCHITECTURAL DRAWINGS.

HVAC INTAKE LOUVER. DO NOT ROUTE ANY PIPING IN FRONT OF OPENING.

PROVIDE NEW CORROSIAN RESISTANT "FDC" SIGN MOUNTED ON WALL ABOVE EXISTING FDC.

EXISTING 6" FIRE SERVICE ENTRY, 4" CHECK VALVE, 4" BACKFLOW PREVENTER, AND FLOW SWITCH

PROVIDE "3D" EXPANSION LOOP FOR ALL PIPE PENETRATIONS THROUGH BUILDING JOINT.

CONNECT TO EXISTING 4" MAIN JUST DOWNSTREAM OF FLOW SWITCH

EXISTING WET SPRINKLER SYSTEM SHALL REMAIN.

REWORK EXISTING WET SPRINKLER SYSTEM FOR NEW ARCHITECTURAL LAYOUT. PROVIDE NEW CONCEALED HEADS. EXISTING HEADS SHALL NOT BE REUSED.

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GENERAL NOTES:

A. PROVIDE NEW SPRINKLER HEADS AND ARMOVERS, DROPS, OR FLEXIBLE HOSES THROUGHOUT THE NEW CEILING AREA. PROVIDE HYDRAULIC CALCULATIONS FOR THE RENOVATED AREA.
B. IF FLEXIBLE SPRINKLER HOSES ARE UTILIZED THE HOSE LENGTHS AND EQUIVILENT LENGTHS SHALL BE NOTED ON THE SHOP DRAWINGS.
C. WHERE WALLS ARE MODIFIED, VERIFY COVERAGE IN THE ADJACENT SPACES TO ENSURE COMPLETE COVERAGE ON BOTH SIDES OF THE ASSOCIATED MODIFICATION. RELOCATE OR ADD NEW HEADS AS REQUIRED.
D. EXISTING BRANCH LINES CAN BE MAINTAINED PROVIDED THEIR LOCATION DOES NOT CONFLICT WITH THE WORK OF OTHER TRADES AND THE PIPE SIZING MEETS THE HYDRAULIC DEMANDS OF THE SYSTEM.
E. PROVIDE A MEANS FOR HYDROSTATICALLY TESTING THE MODIFIED AREA IN ACCORDANCE WITH NFPA 13.
F. COORDINATE NEW SPRINKLER LAYOUT WITH NEW LIGHT FIXTURES AND SUPPLY AIR/RETURN AIR GRILLES. SEE ARCHITRUAL REFLECTED CEILING PLAN.

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MOTTER & MEADOWS
ARCHITECTS

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CONOR P. ECKHARDT
E-86424

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THIS DWG :
OVERALL FIRE PROTECTION PLAN

COMM	17186
DATE	02-24-2022

SCALE: 1/16" = 1'-0"
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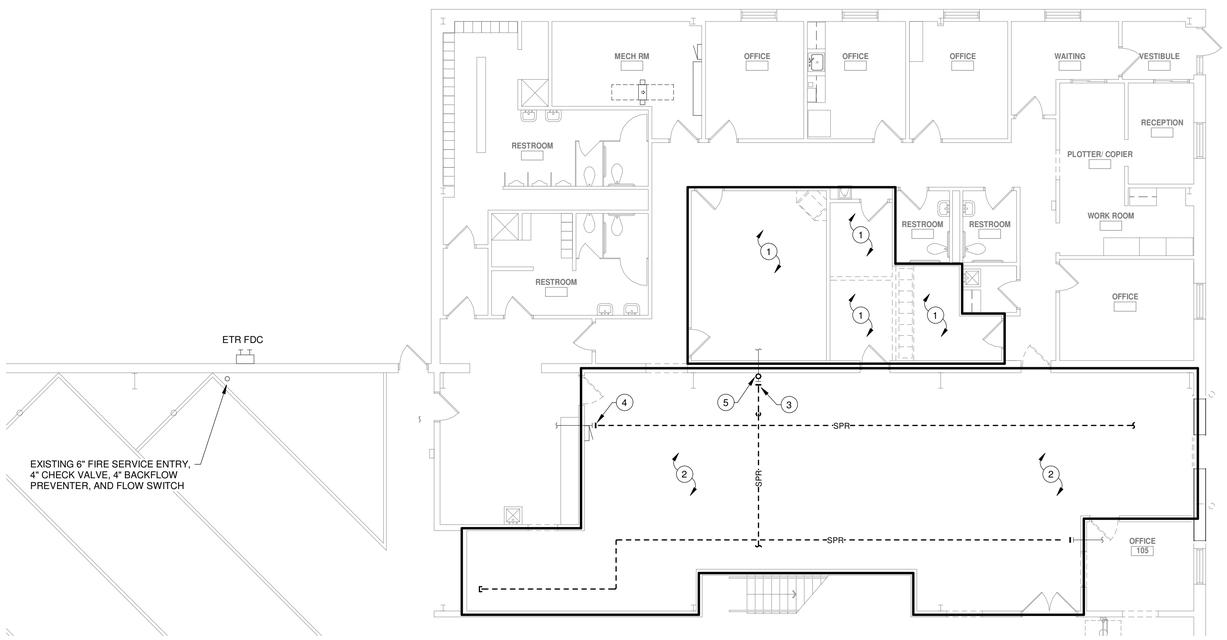
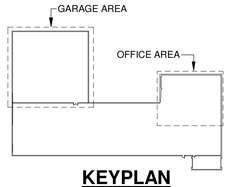


PLAN NOTES

1. REWORK EXISTING SPRINKLERS AND BRANCH PIPING WHERE REQUIRED FOR ARCHITECTURAL MODIFICATIONS. COORDINATE WITH NEW CEILING LAYOUT.
2. REMOVE EXISTING SPRINKLER PIPING BACK TO NEAREST MAIN(S) AND PREPARE FOR RECONNECTION.
3. REMOVE 2.5" SPRINKLER PIPING TO POINT INDICATED AND PREPARE FOR RECONNECTION.
4. REMOVE 1" SPRINKLER PIPING TO POINT INDICATED AND PREPARE FOR RECONNECTION.
5. EXISTING 3" SPRINKLER UP TO MEZZANINE.

DEMOLITION GENERAL NOTES:

A. REMOVE EXISTING SPRINKLER HEADS AND ARM OVERS THROUGHOUT THE AREA OF WORK.
B. CAP OR PLUG/ISOLATE LINES AS REQUIRED TO RE-ESTABLISH THE REMAINDER OF THE SPRINKLER ZONE. SPRINKLER PROTECTION SHALL BE MAINTAINED IN AREAS OUTSIDE THE SCOPE OF WORK.
C. EXISTING BRANCH LINES CAN BE MAINTAINED PROVIDED THEIR LOCATION DOES NOT CONFLICT WITH THE WORK OF OTHER TRADES AND THE PIPE SIZING MEETS THE HYDRAULIC DEMANDS OF THE SYSTEM.



KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

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THIS DWG :
OFFICE AREA FIRE PROTECTION DEMOLITION PLAN

ISSUED FOR BID

COMM 17186
DATE 02-24-2022

DWG
FPD-1.2

DRAWING LIST - HVAC

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TEMPERATURE/HUMIDITY DESIGN PARAMETERS

OUTSIDE	
SUMMER:	95°F DB, 75°F WB
WINTER:	-5°F
INSIDE (SUMMER):	
OFFICE AREAS:	74°F, 60% RH MAXIMUM
STOCK ROOM:	NO MAX. °F, 60% RH MAXIMUM
GARAGE:	NO MAX. °F, 60% RH MAXIMUM
INSIDE (WINTER):	
OFFICE AREAS:	72°F, NO MINIMUM % RH
STOCK ROOM:	65°F, NO MINIMUM % RH
GARAGE:	65°F, NO MINIMUM % RH

HVAC SYMBOLS

SYMBOL	DESCRIPTION
	TURNING VANES
	VOLUME DAMPER
	MOTOR OPERATED DAMPER
	SUPPLY DUCT
	RETURN OR EXHAUST DUCT
	FLEXIBLE DUCT CONNECTION
	EXISTING DUCTWORK & EQUIPMENT
	EXISTING DUCTWORK & EQUIPMENT TO BE REMOVED
	EXISTING PIPING
	EXISTING PIPING TO BE REMOVED
	SHUT OFF VALVE
	UNION
	PIPE BRANCH TAKE-OFF FROM BOTTOM
	PIPE BRANCH TAKE-OFF FROM TOP
	PIPE DROP
	PIPE RISE
T	THERMOSTAT/TEMPERATURE SENSOR
	AIRFLOW DIRECTION

GENERAL HVAC ABBREVIATIONS

ABBREVIATION	DESCRIPTION
AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
APD	AIR PRESSURE DROP
ATR	AIR TEMPERATURE RISE
BAS	BUILDING AUTOMATION SYSTEM
CO	CLEAN OUT
CTE	CONNECT TO EXISTING
DDC	DIRECT DIGITAL CONTROL
DSD	DUCT SMOKE DETECTOR
DV	DRAIN VALVE
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
FPC	FIRE PROTECTION CONTRACTOR
GC	GENERAL CONTRACTOR
IC	IN-LINE-CENTRIFUGAL
LAT	LEAVING AIR TEMPERATURE
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MOP	MAXIMUM OVERCURRENT PROTECTION
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OA	OUTSIDE AIR
OV	OUTLET VELOCITY
PC	PLUMBING CONTRACTOR
PLEN	PLENUM
REX	REMOVE EXISTING
RF	RETURN FAN
RR	REMOVE AND RELOCATE
RV	RELIEF VALVE
SF	SUPPLY FAN
SP	STATIC PRESSURE
TCC	TEMPERATURE CONTROL CONTRACTOR
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
VTR	VENT THRU ROOF

EQUIPMENT TAGGING LEGEND

ABBREVIATION	TAGGING DESCRIPTION
S,R,E	XX-XX XXX(X) ABBREVIATION TYPE DUCT CONNECTION SIZE. SEE GRILLE AND DIFFUSER SCHEDULE FOR ADDITIONAL INFORMATION. QUANTITY CFM
CC, CU, EF, EUH, F, GRH, GUH, PTAC	XXX-X ABBREVIATION MARK

DUCT SYSTEM ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CAI	COMBUSTION AIR INTAKE
EA	EXHAUST AIR
FLUE	FLUE
OA	OUTDOOR AIR
RA	RETURN AIR
SA	SUPPLY AIR

PIPE SYSTEM ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CD	AC CONDENSATE DRAIN PIPING
RL	REFRIGERANT LIQUID PIPING
RS	REFRIGERANT SUCTION PIPING

HVAC ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CC	COOLING COIL
CU	CONDENSING UNIT
E	EXHAUST GRILLE
EF	EXHAUST FAN
EUH	ELECTRIC UNIT HEATER
F	FURNACE
GMCP	GAS MONITORING CONTROL PANEL
GRH	GAS RADIANT HEATER
GUH	GAS UNIT HEATER
L	LOUVER
MOD	MOTOR OPERATED DAMPER
PTAC	PACKAGED TERMINAL AIR CONDITIONER
R	RETURN GRILLE
S	SUPPLY GRILLE OR DIFFUSER
VD	VOLUME DAMPER

GENERAL HVAC NOTES:

A. THE HVAC SYSTEM SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE CODES AND STANDARDS.

B. DRAWINGS ARE DIAGRAMMATIC. INDICATED POSITIONS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. EXACT EQUIPMENT LOCATIONS AND DUCTWORK AND PIPING ROUTING SHALL BE SUBJECT TO BUILDING CONSTRUCTION AND INTERFERENCES WITH OTHER TRADES. WHERE THE LOCATION OF A SPECIFIC PIPE, DUCT, OR DEVICE IS DIMENSIONED, ITS INSTALLED LOCATION SHALL BE AS DIMENSIONED UNLESS COORDINATED OTHERWISE WITH THE ARCHITECT OR ENGINEER.

C. ALTHOUGH ATTEMPTS HAVE BEEN MADE TO IDENTIFY EXISTING EQUIPMENT LOCATIONS, PIPE AND DUCTWORK ROUTING, AND SIZES WITH THE USE OF EXISTING DRAWINGS AND FIELD OBSERVATIONS, MC SHALL FIELD VERIFY EXISTING INFORMATION AND REPORT ANY DISCREPANCIES TO THE ARCHITECT OR ENGINEER. CONTRACTOR SHALL NOTE DISCREPANCIES ON THE RECORD DRAWINGS.

D. UNLESS NOTED OTHERWISE, SERVICES INDICATED AS BEING REMOVED SHALL BE REMOVED TO THE POINT INDICATED FOR RECONNECTION, OR BACK TO THE MAIN, CAPPED, AND IDENTIFIED. REMOVE PREVIOUSLY ABANDONED PIPING, DUCTWORK, SUPPORTS, ETC ENCOUNTERED ABOVE CEILINGS.

E. THE OWNER SHALL HAVE THE OPTION OF RETAINING ANY OR ALL REMOVED EQUIPMENT FOR SALVAGE. MC SHALL DISPOSE OF EQUIPMENT NOT RETAINED BY THE OWNER.

F. WHERE EXISTING THERMOSTATS, THERMOMETERS, OR OTHER EQUIPMENT CONTAINS MERCURY OR MERCURY BASED PRODUCTS, FOLLOW EPA UNIVERSAL WASTE RULES FOR REMOVAL, TRANSPORTATION, AND RECYCLING.

G. WHERE WORK OCCURS OUTSIDE THE PROJECT SCOPE BOUNDARY, THE CONTRACTOR PERFORMING THE WORK SHALL BE RESPONSIBLE FOR THE REMOVAL AND REINSTALLATION OF CEILINGS, GRIDS, AND LIGHTS AS REQUIRED TO PERFORM THE WORK.

H. CUTTING AND PATCHING OF WALLS AND FLOORS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION. IF THE MC DEFACES OR DAMAGES WALLS, CEILINGS, FLOORS, OR FINISHES, THE MC SHALL BE RESPONSIBLE FOR PATCHING, REPAIRING, AND REFINISHING. PATCHING MATERIALS SHALL MATCH THE EXISTING OR NEW CONDITIONS AS APPLICABLE. FINISH PAINTING SHALL BE BY THE GENERAL CONTRACTOR.

I. PROVIDE FIRESTOPPING AT PENETRATIONS OF FIRE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF FIRE-RATED ASSEMBLIES. FIRESTOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

J. EXCEPT FOR SLAB ON GRADE, PROVIDE FIRESTOPPING AT PENETRATIONS OF NON-FIRE-RATED FLOORS. FIRESTOPPING SHALL BE PERFORMED BY THE CONTRACTOR PERFORMING THE WORK REQUIRING THE PENETRATION.

K. WHERE DUCTS, CONDUITS, OR PIPES ARE REMOVED THROUGH FIRE-RATED FLOORS OR WALLS, THE CONTRACTOR REMOVING THE DEVICE/MATERIAL SHALL SEAL THE REMAINING OPENING TO MAINTAIN FIRE RATING.

L. PROVIDE FILLING AND SEALING OF THE AREA AROUND PENETRATIONS OF SMOKE-RATED ASSEMBLIES. REFER TO THE ARCHITECTURAL LIFE SAFETY PLANS FOR THE LOCATION OF SMOKE-RATED ASSEMBLIES. MATERIALS USED SHALL BE COMPATIBLE WITH THE ASSEMBLY BEING PENETRATED.

M. INSTALL EQUIPMENT REQUIRING AN ELECTRICAL CONNECTION IN SUCH A MANNER SO THAT PROPER CLEARANCE IS PROVIDED FOR SERVICING PER THE NATIONAL ELECTRIC CODE.

N. PROVIDE ROOFING WORK WHERE THE INSTALLATION OF HVAC EQUIPMENT, PIPING, OR DUCTWORK PENETRATES OR DAMAGES AN EXISTING ROOF MEMBRANE. EXISTING ROOF WARRANTIES SHALL BE MAINTAINED. COORDINATE ROOF PENETRATIONS WITH THE ARCHITECT.

O. EQUIPMENT LAYOUT IS BASED ON SCHEDULED EQUIPMENT. ACTUAL INSTALLED EQUIPMENT SIZE, CONFIGURATION, AND DUCTWORK/PIPING CONNECTIONS SHALL BE COORDINATED WITH THE BUILDING AND DUCTWORK/PIPING LAYOUT.

P. EQUIPMENT SCHEDULES CONTAIN BOTH NOTES AND REMARKS. NOTES APPLY TO ALL EQUIPMENT SCHEDULED. REMARKS APPLY ONLY TO SPECIFIC EQUIPMENT AS INDICATED.

Q. EQUIPMENT, VALVES, DAMPERS, CONTROL DEVICES, ETC. SHALL BE ACCESSIBLE. IF LOCATED ABOVE DRYWALL CEILING OR BEHIND FINISHED WALL, PROVIDE AN ACCESS DOOR. COORDINATE ACCESS DOOR LOCATIONS WITH ARCHITECT.

R. HVAC SYSTEM PIPING AND DUCTWORK SHALL NOT BE INSTALLED IN ELECTRICAL ROOMS, OR INFORMATION TECHNOLOGY (LOW VOLTAGE) ROOMS.

S. DO NOT SUPPORT DUCTWORK OR PIPING FROM ANOTHER DUCT, PIPE, OR CONDUIT. DO NOT SUPPORT ANY ITEM FROM METAL ROOF DECK.

T. NO EXPOSED PIPING OR DUCTWORK SHALL BE INSTALLED BELOW 7'-6" IN AN EGRESS CORRIDOR.

U. ATTENTION IS CALLED TO THE LIMITED CEILING SPACE. COORDINATE ALL WORK WITH CEILING HEIGHTS, SOFFITS, STRUCTURE, AND LIGHTS. HOLD DUCTWORK AS HIGH AS POSSIBLE, TO DECK BETWEEN BEAMS IF REQUIRED, AND TIGHT TO STRUCTURE. PROVIDE ANY AND ALL OFFSETS AND EFFORT REQUIRED TO FACILITATE THE INSTALLATION OF OTHER EQUIPMENT AND SYSTEMS. COORDINATE CLOSELY WITH OTHER TRADES.

V. UNLESS NOTED OTHERWISE, STANDARD ROOM SENSOR/THERMOSTAT MOUNTING HEIGHT SHALL BE 44" ABOVE THE FINISHED FLOOR TO THE CENTERLINE OF THE DEVICE. REFER TO ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.

W. DO NOT LOCATE THERMOSTATS OR SENSORS ON AN EXTERIOR WALL, BEHIND OPEN DOORS, OR IN CONFLICT WITH FURNITURE OR WALL HUNG DEVICES. COORDINATE EXACT LOCATION WITH OWNER/ARCHITECT.

X. CONTROL WIRING SHOWN ON PLAN DOES NOT INDICATE ROUTING OR SCOPE OF WORK BETWEEN EQUIPMENT AND SENSOR/STAT. CONTROL WIRING SHOWN INDICATES EQUIPMENT ZONING.

Y. DUCTWORK DIMENSIONS SHOWN ARE GROSS (OUTSIDE SHEETMETAL SIZE).

Z. DURING CONSTRUCTION, COVER SUPPLY, RETURN, AND EXHAUST DUCTWORK OPENINGS TO PREVENT CONSTRUCTION DUST FROM ENTERING THE DUCTWORK. IF DUST COLLECTS INSIDE DUCTWORK, DUCTWORK SHALL BE CLEANED PRIOR TO PROJECT TURNOVER.

AA. DUCTWORK SHALL BE PRESSURE TESTED AS INDICATED IN THE SPECIFICATIONS. IF A SECTION OF DUCTWORK FAILS THE TEST, THE SECTION SHALL BE SEALED AND RETESTED UNTIL IT PASSES.

BB. RADIUS ELBOWS SHALL BE UTILIZED THROUGHOUT THE DUCTWORK SYSTEM. UNLESS SPECIFICALLY SHOWN, DO NOT USE 90° ELBOWS WITH TURNING VANES WITHOUT PRIOR APPROVAL OF THE ENGINEER.

CC. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR CEILING TYPES, GRID LAYOUT, AND EXACT LOCATIONS OF CEILING DIFFUSERS AND GRILLES.

DD. DUCT RUNOUT SIZE SHALL BE THE SAME AS THE DIFFUSER OR GRILLE CONNECTION SIZE UNLESS NOTED OTHERWISE.

EE. INSTALL AND PROPERLY SUPPORT FLEXIBLE DUCTWORK TO AVOID AIRFLOW RESTRICTIONS. NO KINKS OR CRIMPS ARE PERMITTED.

FF. FLEXIBLE DUCTWORK SHALL NOT PENETRATE THRU WALLS. RIGID SHEETMETAL DUCTWORK IS REQUIRED AT WALL PENETRATIONS.

GG. FLEXIBLE DUCTWORK SHALL NOT BE USED IN EXPOSED LOCATIONS.

HH. PROVIDE A VOLUME DAMPER FOR EACH DIFFUSER AND GRILLE. LOCATE THE DAMPER AT THE BRANCH DUCTWORK CONNECTION TO THE MAIN.

II. PROVIDE VOLUME DAMPER HANDLE EXTENSIONS FOR VOLUME DAMPERS INSTALLED IN INSULATED DUCTWORK..

JJ. PROVIDE DUCTWORK ACCESS DOORS FOR MOTOR OPERATED DAMPERS, ETC. IMPORTANT THAT DUCTWORK ACCESS DOORS ARE ACCESSIBLE. IF LOCATED ABOVE DRYWALL CEILING OR BEHIND FINISHED WALL, PROVIDE ACCESS DOOR. COORDINATE ACCESS DOOR LOCATIONS WITH ARCHITECT.

KK. PROVIDE TRAPPED AIR CONDITIONING CONDENSATION DRAINS FOR COOLING COILS. SIZE TRAPS PER UNIT MANUFACTURER'S RECOMMENDATIONS. PIPE COOLING COIL CONDENSATE DRAIN PIPING TO SPLASH BLOCK, MOP BASIN, OR NEAREST FLOOR DRAIN AS APPLICABLE. REFER TO PLANS. PROVIDE AIR GAP AT TERMINATION.

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MOTTI & MEADOWS ARCHITECTS

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THIS DWG :
HVAC LEGEND AND GENERAL NOTES

COMM 17186
DATE 02-24-2022

DWG
H-0.1

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FURNACE SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	TYPE	FUEL	EFFICIENCY (%)	FAN DATA CFM	MIN OA CFM.	ESP ("WC)	MOTOR HP	VOLT	PH	HEATER DATA EAT (°F)	LAT (°F)	INPUT (MBH)	OUTPUT (MBH)	MIN. GAS PRESS. ("WC)	STAGES	COOLING COIL MARK	FILTER	MANUFACTURER	MODEL
F	3	DIRECT VENT	NATURAL GAS	96%	1300	250	0.75	3/4	120	1	57.2	98	60	58	4.5	2	CC-3	MERV 13	CARRIER	59TP6B060C17--14

NOTES:
A. COMBUSTION AIR INTAKE AND FLUE SIZE = 3"
B. DISCONNECT SWITCH BY EC.
C. MCA = 10.9, MOP = 15
D. UPFLOW CONFIGURATION WITH TOP SUPPLY AIR CONNECTION AND SIDE RETURN AIR CONNECTION.
E. ELECTRONICALLY COMMUTATED FAN MOTOR (ECM).
F. ENTERING AIR TEMPERATURE (EAT) LISTED IS FOR AN OUTDOOR AIR TEMPERATURE OF -5 AND AN INDOOR RETURN AIR TEMPERATURE OF 72. DESIGN OUTDOOR AIR PERCENTAGE IS 19%.
G. INDICATED HEATER INPUT, OUTPUT, AND LAT ARE FOR THE HIGH STAGE OF HEAT. THE LOW STAGE OF HEAT IS ANTICIPATED MAXIMUM HEAT NEEDED. LOW HEATING STAGE INFO: INPUT = 39 MBH, OUTPUT = 38 MBH, LAT = 84 DEGREES F.
H. FURNACE'S FAN CONTROL SHALL BE CONFIGURED FOR CONSTANT VOLUME AIRFLOW CONTROL DURING OCCUPIED HOURS TO MEET MINIMUM VENTILATION REQUIREMENTS.
I. 17.5" UNIT SIZE (ONE SIZE SMALLER THAN SELECTED COOLING COIL).
J. CONDENSATE ACID NEUTRALIZATION KIT.
K. MERV 13 FILTER WITH ASSOCIATED FILTER CABINET FOR MOUNTING IN RETURN DUCT BESIDE FURNACE.

COOLING COIL SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	SERVICE	CFM	SIZE (IN x IN)	TOTAL MBH	SENSIBLE MBH	EAT (DB °F)	EAT (WB °F)	LAT (DB °F)	LAT (WB °F)	REFRIGERANT	SUCT. TEMP. (°F)	CU MARK	MANUFACTURER	MODEL
CC	3	F-3	1300	21 x 21	42.5	35.7	78.0	64.5	55	54	R-410A	40	CU-3	CARRIER	CNPVT4221ALA

NOTES:
A. NOMINAL 3.5 TON COOLING COIL. TOTAL AND SENSIBLE CAPACITIES LISTED IS AT THE ACTUAL DESIGN OPERATING CONDITIONS.
B. ENTERING AIR TEMPERATURES (EATs) LISTED ARE FOR AN OUTDOOR AIR TEMPERATURE OF 95 DB / 75 WB AND AN INDOOR RETURN AIR TEMPERATURE OF 74 DB / 62 WB. DESIGN OUTDOOR AIR PERCENTAGE IS 19%.
C. COOLING COIL SELECTED FOR COMPATIBILITY WITH ASSOCIATED FURNACE AND CONDNESING UNIT.
D. COOLING COIL IS "TRANSITION TYPE" THAT ALLOWS IT TO BE CONFIGURED WITH A FURNACE ONE SIZE SMALLER WITHOUT ANY FIELD DUCT TRANSITIONS OR MODIFICATIONS.

CONDENSING UNIT SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	SERVICE	SEER	MBH	REFRIGERANT	SUCT. TEMP. (°F)	CONDENSER DATA NO. FANS	HP (EA)	ATT (°F)	ELECTRICAL VOLT	PH	MCA	MOP	OPER. WEIGHT (LB)	MANUFACTURER	MODEL
CU	3	F-3 / CC-3	14	32.7	R-410A	40	1	1/4	95	208	1	22.3	35	200	CARRIER	24ACC442A003

NOTES:
A. WEATHERPROOF DISCONNECT SWITCH BY EC.
B. REFRIGERANT PIPING SHALL BE ENGINEERED BY THE EQUIPMENT MANUFACTURER. MC SHALL WORK CLOSELY WITH THE EQUIPMENT MANUFACTURERS TO DETERMINE THE REQUIREMENTS FOR THE REFRIGERANT PIPING INCLUDING LAYOUT, ROUTING, SIZE, VALVING, ACCESSORIES AND THE NEED FOR DOUBLE SUCTION RISERS.
C. PROVIDE CONCRETE HOUSEKEEPING PAD FOR AT-GRADE INSTALLATION.
D. PROVIDE INTERLOCKING CONTROL WIRING BETWEEN CU AND ASSOCIATED FURNACE/ THERMOSTAT.
E. PROVIDE WITH THE FOLLOWING ACCESSORIES FOR LONG REFRIG. LINE INSTALLATION: COMPRESSOR START ASSIST (CAPACITOR AND RELAY), CRANKCASE HEATER, HARD SHUT-OFF THERMOSATIC EXPANSION VALVE.
F. COMPRESSOR MOUNTED ON RUBBER VIBRATION ISOLATORS.
G. LIQUID AND VAPOR LINE SHUT-OFF VALVES.
H. REFRIGERANT LOW PRESSURE SWITCH AND FILTER DRYER.

GAS UNIT HEATER SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	TYPE	FUEL	EFFICIENCY (%)	MIN. GAS PRESS. ("WC)	INPUT (MBH)	OUTPUT (MBH)	EAT (°F)	LAT (°F)	STAGES	FAN TYPE	CFM	MOTOR HP	VOLT	PH	BOTTOM AFF (FT)	MANUFACTURER	MODEL
GUH	1	SEPARATED COMBUSTION	NATURAL GAS	83	6"	150	124.5	60	120	2	PROPELLER	1920	1/6	120	1	12.5	REZNOR	UDZ150
GUH	2	SEPARATED COMBUSTION	NATURAL GAS	83	6"	60	49.8	60	120	2	PROPELLER	770	1/6	120	1	12.5	REZNOR	UDZ60

NOTES:
A. CONTROL STEP DOWN TRANSFORMER.
B. 2 STAGE GAS VALVE.
C. FINGERPROOF FAN GUARD.
D. HORIZONTAL AIR DEFLECTOR BLADES.
E. INTEGRAL DISCONNECT.
F. INTEGRAL THERMOSTAT.

FAN SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	SERVICE	TYPE	CFM	SP ("WC)	OV (FPM)	TIP SPEED (FPM)	RPM	BHP	LOAD		VOLT	PHASE	POWER TYPE	OPER. WEIGHT (LB)	MANUFACTURER	MODEL	REMARKS
EF	12	GARAGE VENTILATION	INLINE	3,700	0.65	1,031	6,625	1725	1.2	2	HP	208	1	NORMAL	200	GREENHECK	SQ-160-VG	1,2,3,5
EF	13	GARAGE VENTILATION	INLINE	1,000	0.65	581	4,634	1725	0.22	0.5	HP	208	1	NORMAL	100	GREENHECK	SQ-120-VG	1,2,3,5,6
EF	14	STOCK ROOM VENTIALTION	INLINE	500	0.65	382	5,237	2200	0.23	0.75	HP	208	1	NORMAL	100	GREENHECK	SQ-98-VG	1,2,3,4

REMARKS:
1. TWO (2) 120V MOTOR OPERATED DAMPERS FURNISHED AND INSTALLED BY MC. REFER TO FLOOR PLANS FOR LOCATIONS.
2. DISCONNECT SWITCH BY EC.
3. VIBRATION ISOLATORS.
4. ELECTRONICALLY COMMUTATED MOTOR (ECM) WITH FACTORY-MOUNTED VARIABLE SPEED CONTROLLER FOR AIRFLOW BALANCING. COORDINATE CLOSELY WITH WIRING AND CONTROL DIAGRAM ON SHEET H-6.2.
5. ELECTRONICALLY COMMUTATED MOTOR (ECM) WITH VARIABLE SPEED CONTROLLER FOR AIRFLOW BALANCING AND FOR ON/OFF CONTROL AND/OR VARIABLE SPEED CONTROL THROUGH GAS MONITORING SYSTEM. FAN SPEED CONTROLLER SHALL BE TWO-SPEED TYPE. COORDINATE CLOSELY WITH WIRING AND CONTROL DIAGRAM ON SHEET H-6.2.
6. FAN SHALL BE SELECTED TO OPERATE PROPERLY AT BOTH THE HIGH AIRFLOW CONDITION INDICATED IN THE SCHEDULE AND AT THE LOW AIRFLOW CONDITION OF 500 CFM.

GAS FIRED RADIANT HEATER SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	EFFICIENCY (%)	MIN. GAS PRESS. ("WC)	INPUT (MBH)	OUTPUT (MBH)	VOLT	PH	BOTTOM AFF (FT)	MANUFACTURER	MODEL
GRH	1	80	4.6	150	120	120	1	16	ROBERTS-GORDON	BH-150
GRH	2	80	4.6	150	120	120	1	16	ROBERTS-GORDON	BH-150
GRH	3	80	4.6	150	120	120	1	16	ROBERTS-GORDON	BH-150
GRH	4	80	4.6	125	100	120	1	18	ROBERTS-GORDON	BH-125
GRH	5	80	4.6	125	100	120	1	18	ROBERTS-GORDON	BH-125

NOTES:
A. WIRED, WALL-MOUNTED, REMOTE THERMOSTAT.
B. DISCONNECT SWITCH BY EC.
C. STRAIGHT TUBE CONFIGURATION WITH A LENGTH OF 40 FEET.
D. STANDARD REFLECTOR.

ELECTRIC UNIT HEATER SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	TYPE	CFM	KW	MBH	AMPS	VOLTAGE	PHASE	THERMOSTAT	MOUNTING	BOTTOM AFF (FT)	MANUFACTURER	MODEL
EUH	1	WALL	350	3	10.2	14.5	208	1	INTEGRAL	WALL	8	QMARK	MUH03-81

NOTES:
A. PROVIDED WITH INTEGRAL COMPONENTS REQUIRED FOR SELF-CONTAINED THERMOSTAT CONTROL.
B. INTEGRAL DISCONNECT.
C. AMPS INDICATED IS TOTAL LINE AMPERAGE, INCLUDING MOTOR AMPS.

DUCTWORK INSULATION SCHEDULE

SERVICE	TYPE	THICKNESS
SUPPLY DUCTWORK CONCEALED AND ABOVE CEILING	WRAP FRK	2"
SUPPLY DUCTWORK EXPOSED	RIGID ASJ	2"
EXHAUST PLENUMS	RIGID ASJ	2"
EXHAUST DUCTWORK BETWEEN MOD AND OUTSIDE	RIGID ASJ	2"
METAL COMBUSTION AIR INTAKES	RIGID ASJ	2"
OUTSIDE AIR PLENUMS	RIGID ASJ	2"
OUTSIDE AIR DUCTWORK	RIGID ASJ	2"

NOTES:
1. DUCTWORK LISTED IN SCHEDULE SHALL INCLUDE STRAIGHT RUNS, FITTINGS, PLENUMS, DAMPERS AND ANY DUCT SYSTEM COMPONENTS WHERE CONDENSATION MAY FORM. WHERE DUCT HANGER/SUPPORT IS IN CONTACT WITH DUCTWORK, HANGER/SUPPORT ADJACENT TO DUCT SHALL BE INSULATED TO PREVENT CONDENSATION.
2. INSULATED DUCT ACCESS DOORS SHALL NOT BE COVERED WITH INSULATION. ADJACENT PERIMETER INSULATION SHALL BE TAPERED, WHERE REQUIRED, AND TAPED TO THE ACCESS DOOR FAME. INSULATION SHALL BE APPLIED SUCH THAT ACCESS DOORS CAN BE OPENED WITHOUT DAMAGING ADJACENT INSULATION.

HVAC PIPE INSULATION SCHEDULE

SERVICE	TYPE	THICKNESS TYPE
AC CONDENSATE DRAIN INSIDE BUILDING	FIBERGLASS	H
REFRIGERANT FOR COOLING ONLY DX SYSTEMS		
REFRIGERANT SUCTION	CLOSED-CELL	J
REFRIGERANT LIQUID EXTERIOR TO BUILDING	CLOSED-CELL	I

THICKNESS SCHEDULE TYPE	PIPE SIZES (INCHES) 3/4 AND BELOW	1 TO 1-1/4	1-1/2 TO 3	4 TO 6	8 AND ABOVE
A	4-1/2	5	5	5	5
B	3	4	4-1/2	4-1/2	4-1/2
C	2-1/2	2-1/2	3	3	3
D	1-1/2	1-1/2	2	2	2
E	1	1	1	1	1-1/2
F	1	1	1-1/2	1-1/2	1-1/2
G	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
H	1	1	1-1/2	2	2
I	1/2	1/2	1/2	1/2	1/2
J	1/2	1	1	1	1

PACKAGED TERMINAL AIR CONDITIONING UNIT SCHEDULE

EQUIPMENT TAG ABBREV.	MARK	CFM	COOLING TOTAL MBH	REFRIG. TYPE	EER	HEATING MBH	KW	STAGES	ELECTRICAL VOLT	PH	MCA	MOP	MANUFACTURER	MODEL
PTAC	1	340	7.0	R410A	12.4	6.1	1.5	2	208	1	8.5	15	AMANA	PTH073G15
PTAC	2	340	7.0	R410A	12.4	6.1	1.5	2	208	1	8.5	15	AMANA	PTH073G15

NOTES:
A. HEATING MBH LISTED IS THE CAPACITY OF THE REVERSE CYCLE HEAT PUMP. THE 2 STAGES OF HEATING LISTED IS TO INDICATE THE FIRST STAGE VIA HEAT PUMP AND SECOND STAGE VIA ELECTRIC HEATER. THE TOTAL HEATING CAPACITY BETWEEN BOTH STAGES IS 10.3 MBH.
B. PROVIDE WITH POWER DOOR KIT TO ALLOW OUTDOOR AIR DAMPER TO AUTO OPEN WHEN FAN IS ON. OUTDOOR AIR LOUVER AND DAMPER PROVIDES APPROXIMATELY 65 CFM OF OUTDOOR AIR.
C. REMOTE-MOUNTED (WALL) THERMOSTAT CONTROL, HARD-WIRED TO PTAC FOR POWER AND COMMUNICATION.
D. INSULATED WALL SLEEVE.
E. ARCHITECTURAL EXTRUDED ALUMINUM OUTDOOR GRILLE WITH BAKED-ON PAINT. COLOR SELECTED BY ARCHITECT. SUBMIT MANUFACTURER'S STANDARD COLOR CHART WITH SHOP DRAWINGS.
F. CONDENSATE DRAIN KIT FOR EXTERNAL DISPOAL OF CONDENSATE.
G. UNIT PROVIDED WITH ELECTRICAL SUB-BASE WITH FUSED DISCONNECT SWITCH, FOR HARD-WIRED POWER CONNECTION. WIRING ENTRY THROUGH BOTTOM OF SUB-BASE.
H. LEVELING LEG SUPPORTS WITH UNIT SUB-BASE ASSEMBLY.
I. PERMANENT WASHABLE FILTER.

GRILLE AND DIFFUSER SCHEDULE

EQUIPMENT TAG ABBREV.	TYPE	LOCATION	MANUFACTURER	MODEL	FRAME/BORDER	MODULE SIZE	PATTERN	DAMPER MODEL	FINISH	REMARKS
E	1	DUCT MTD	TITUS	63FL	SURFACE	SEE PLANS	30 DEG DEFLECT	-	WHITE	-
R	1	CEILING	TITUS	350RL	LAY-IN	24/12	35 DEG DEFLECT	-	WHITE	1
R	2	CEILING	TITUS	350RL	LAY-IN	24/12	35 DEG DEFLECT	-	WHITE	-
S	1	CEILING	TITUS	OMNI	LAY-IN	24/24	4-WAY	-	WHITE	-

NOTES:
A. REFER TO DRAWINGS FOR DUCT CONNECTION SIZE.

REMARKS:
1. PROVIDE SHOP FABRICATED PLENUM (3" TALL MINIMUM) FOR ROUND DUCT CONNECTION. FINAL DIMENSION SHALL ACCOMODATE DUCT CONNECTION SIZE.

REVISIONS:

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MOTTI & MEADOWS ARCHITECTS

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E-86424
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HVAC SCHEDULES

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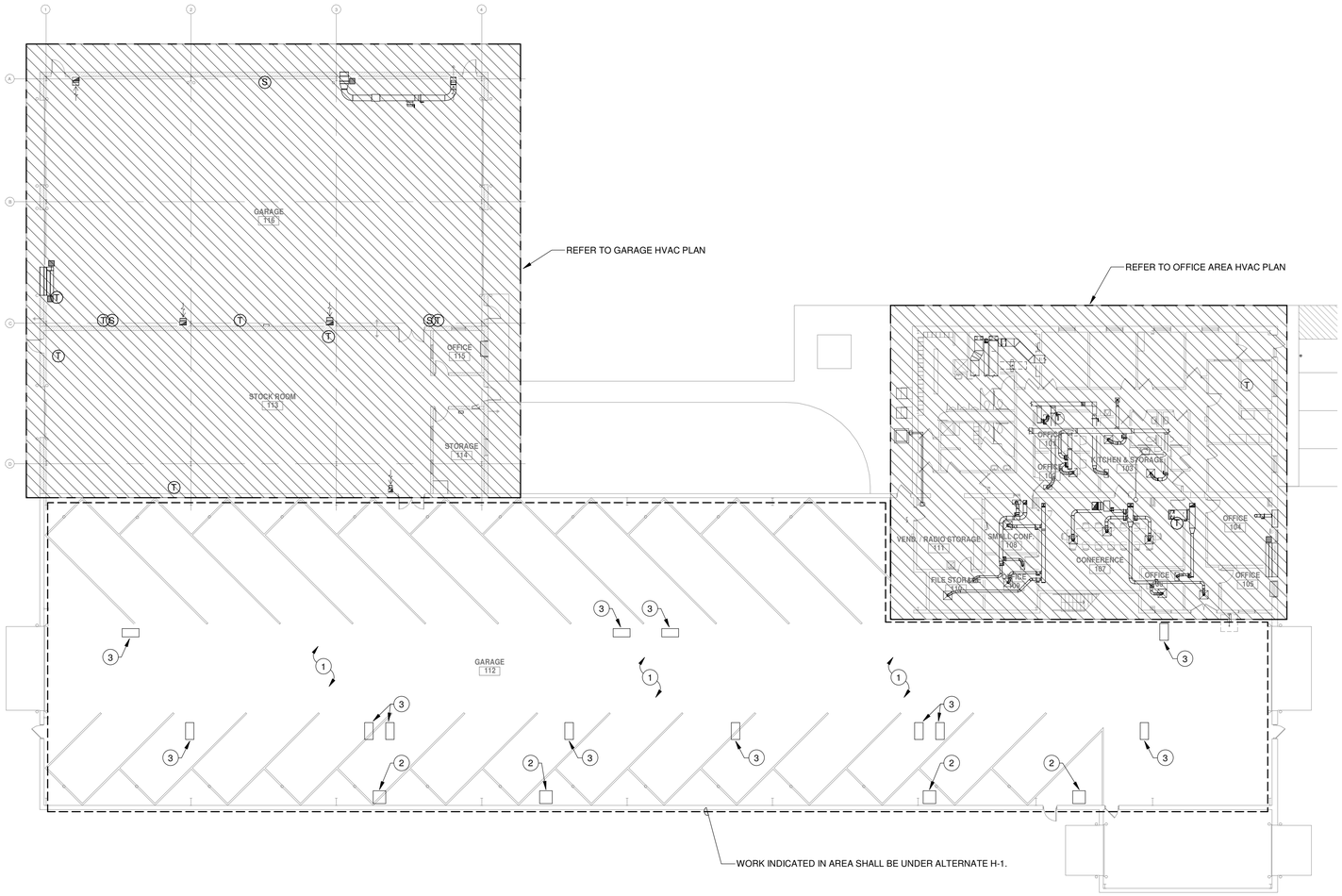

PLAN NOTES

1. EXISTING GAS FIRED RADIANT HEATING SYSTEM SERVING GARAGE (PREMIER VS VACUUM SYSTEM MANUFACTURED BY SUPERIOR RADIANT PRODUCTS). UNDER ALTERNATE H-1, REPLACE ALL OF EXISTING VACUUM PUMPS AND BURNERS IN THE RADIANT HEATING SYSTEMS. FIELD VERIFY THE SIZES AND QUANTITIES OF VACUUM PUMPS AND BURNERS.
2. UNDER ALTERNATE H-1, REPLACE EXISTING PREMIER VS SYSTEM VACUUM PUMP (A PUMP, 3/4 HP, 115VAC, 1 PH). INCLUDE REMOVAL AND REINSTALLATION OF DUCTWORK, ELECTRICAL, ETC. AS NEEDED FOR PUMP REPLACEMENT.
3. UNDER ALTERNATE H-1, REPLACE EXISTING PREMIER VS SYSTEM BURNER. INCLUDE REMOVAL AND REINSTALLATION OF NATURAL GAS PIPING, FLUE, ELECTRICAL, ETC. AS NEEDED FOR BURNER REPLACEMENT.

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SCALE: 1/16" = 1'-0"
0 4' 8' 12' 16' 24' 32'

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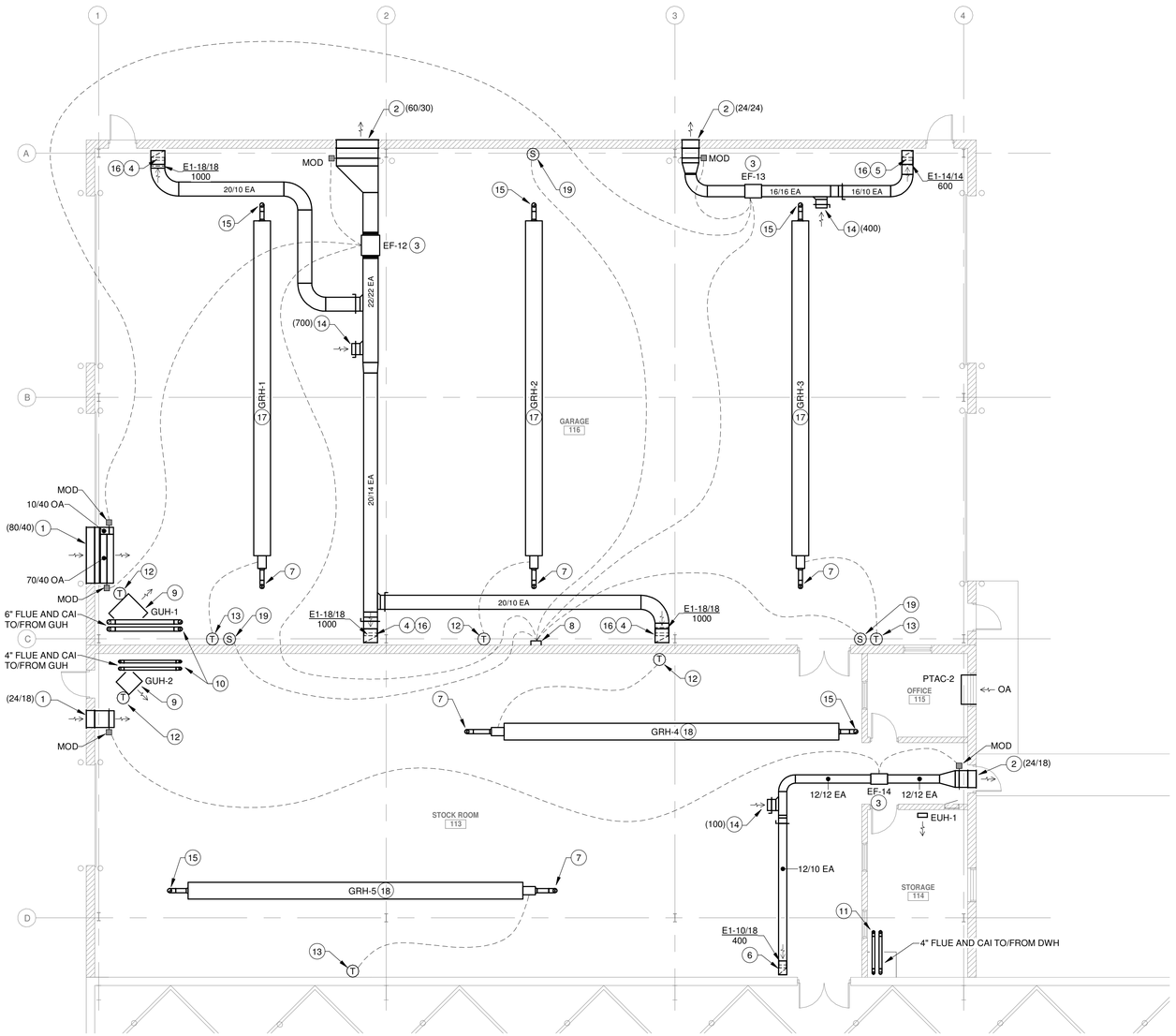


GENERAL NOTES:

A. ALL DUCTWORK ROUTED HORIZONTALLY THROUGH GARAGE AND STOCK ROOM SPACES SHALL BE INSTALLED AS HIGH AS POSSIBLE AND TIGHT TO ROOF STRUCTURE.

(#) PLAN NOTES

1 OA INTAKE LOUVER WITH MOD APPROXIMATELY 15'-0" AFF. SIZE AS NOTED.

2 EA DISCHARGE LOUVER WITH MOD APPROXIMATELY 15'-0" AFF. SIZE AS NOTED.

3 EXHAUST FAN SUSPENDED FROM ROOF STRUCTURE WITH VIBRATION ISOLATORS.

4 20/10 EA DN ALONG WALL. TERMINATE AT 1'-0" AFF. PROVIDE ANGLE-IRON CRASH BARS AROUND DUCTWORK. COORDINATE WITH OWNER AND GC. BALANCE GRILLE TO INDICATED AIRFLOW.

5 16/10 EA DN ALONG WALL. TERMINATE AT 1'-0" AFF. PROVIDE ANGLE-IRON CRASH BARS AROUND DUCTWORK. COORDINATE WITH OWNER AND GC. BALANCE GRILLE TO INDICATED AIRFLOW.

6 12/10 EA DN ALONG WALL. TERMINATE AT 1'-0" AFF. PROVIDE ANGLE-IRON CRASH BARS AROUND DUCTWORK. COORDINATE WITH OWNER AND GC. BALANCE GRILLE TO INDICATED AIRFLOW.

7 COMBUSTION AIR INTAKE UP THRU ROOF. SIZE PER GAS RADIANT HEATER MANUFACTURER'S INSTRUCTIONS. TERMINATE WITH VENT CAP PER MANUFACTURER'S REQUIREMENTS.

8 CO AND NO2 MONITORING SYSTEM CONTROL PANEL, ARMSTRONG MONITORING MODEL AMC-AD1. EC SHALL 120V/1PH HARD-WIRED POWER CONNECTION (DISCONNECT SWITCH BY EC). MONITORING SYSTEM SHALL BE INTEGRATED WITH OPERATION OF FANS/ INTAKES. REFER TO FAN WIRING AND CONTROL DIAGRAM.

9 GUH SUSPENDED FROM ROOF STRUCTURE. COORDINATE FINAL POSITION WITH ADJACENT INTAKE LOUVER TO PROVIDE WINTER TEMPERING OF OUTDOOR AIR ENTERING THE SPACE (APPROXIMATLEY 12'-6" ABOVE FINISHED FLOOR).

10 GUH COMBUSTION AIR INTAKE AND FLUE UP THRU ROOF. INSTALL PER MANUFACTURER'S REQUIREMENTS. REFER TO ROOF TERMINATION DETAIL.

11 DOMESTIC WATER HEATER COMBUSTION AIR INTAKE AND FLUE UP THRU ROOF. REFER TO ROOF TERMINATION DETAIL.

12 THERMOSTAT SHALL BE SET TO 60 DEGREES.

13 THERMOSTAT SHALL BE SET TO 65 DEGREES.

14 16/10 EA INTAKE NEAR ROOF STRUCTURE WITH 1/2" X 1/2" ALUMINUM WIRE MESH GRILLE. BALANCE TO INDICATED AIRFLOW (CFM).

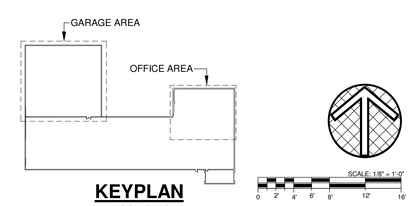
15 FLUE DISCHARGE THROUGH ROOF. SIZE PER GAS RADIANT HEATER MANUFACTURER'S INSTRUCTIONS. REFER TO ROOF TERMINATION DETAIL.

16 ROUTE DUCTWORK DOWN ALONG STEEL AND THEN ONCE PAST THE STEEL, OFFSET OVER TO RUN ALONG BLOCK WALL.

17 INSTALL HEATER LEVEL TO FLOOR. ROOF STEEL JOISTS ARE SLOPED DOWN TOWARDS THE NORTH END OF THE STRUCTURE. HEATER SHALL BE INSTALLED JUST BELOW THE LOWEST POINT OF THE BOTTOM OF JOISTS (APPROXIMATELY 16'-0").

18 INSTALL HEATER LEVEL TO FLOOR. ROOF STEEL JOISTS ARE SLOPED DOWN TOWARDS THE NORTH END OF THE STRUCTURE. HEATER SHALL BE INSTALLED JUST BELOW THE LOWEST POINT OF THE BOTTOM OF JOISTS (APPROXIMATELY 18'-0").

19 COMBINATION CO/NO2 GAS SENSOR, ARMSTRONG MONITORING MODEL AMC-1222. QUANTITY/LAYOUT OF SENSORS SHOWN IS BASED ON SENSORS RATED FOR A COVERAGE AREA WITH A 50 FOOT RADIUS. ACTUAL QUANITITY AND LOCATIONS OF SENSORS SHALL BE COORDINATED WITH THE GAS MONITORING SYSTEM MANUFACTURER'S REQUIREMENTS.



KEYPLAN
SCALE: NONE

MOTTER & MEADOWS ARCHITECTS

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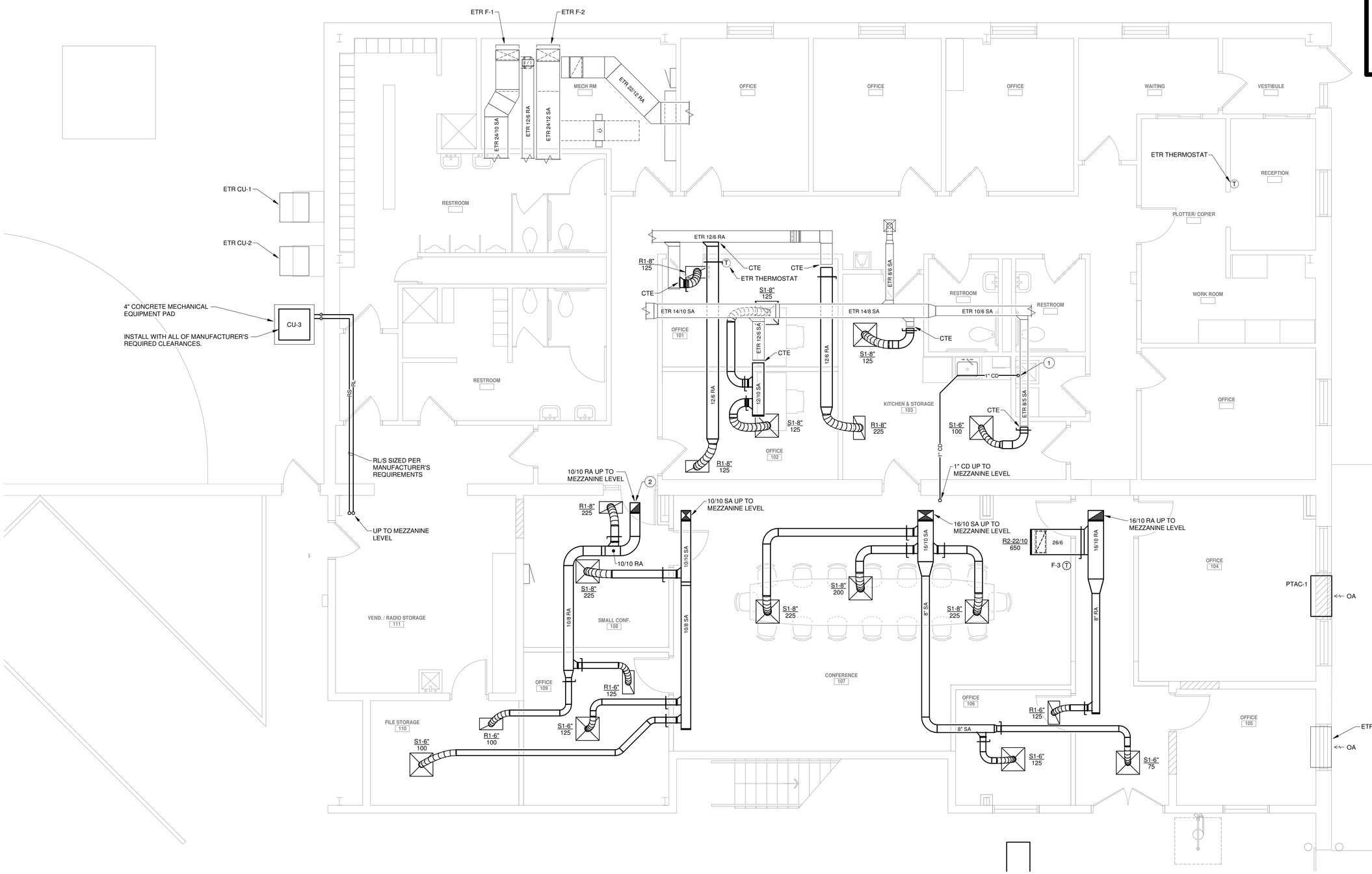


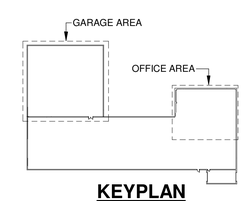
GENERAL NOTES:

A. EXISTING FURNACES SERVE SPACES THAT NEED TO REMAIN ACTIVE THROUGH CONSTRUCTION. SHUT-DOWN OF EQUIPMENT SHALL BE MINIMIZED. COORDINATE WITH OWNER.

(#) PLAN NOTES

1 1" CONDENSATE DRAIN DOWN. DISCHARGE CONDENSATE DRAIN OVER MOP BASIN WITH AIR GAP.

2 NEW DUCTWORK SHALL REUSE EXISTING FLOOR PENETRATION. MECHANICAL CONTRACTOR SHALL INFILL MEZZANINE FLOOR AFTER NEW DUCTWORK IS IN PLACE. REFER TO DEMOLITION PLAN FOR FURTHER INFORMATION.



KEYPLAN
SCALE: NONE

SCALE: 1/4" = 1'-0"
0 2' 4' 6' 8'

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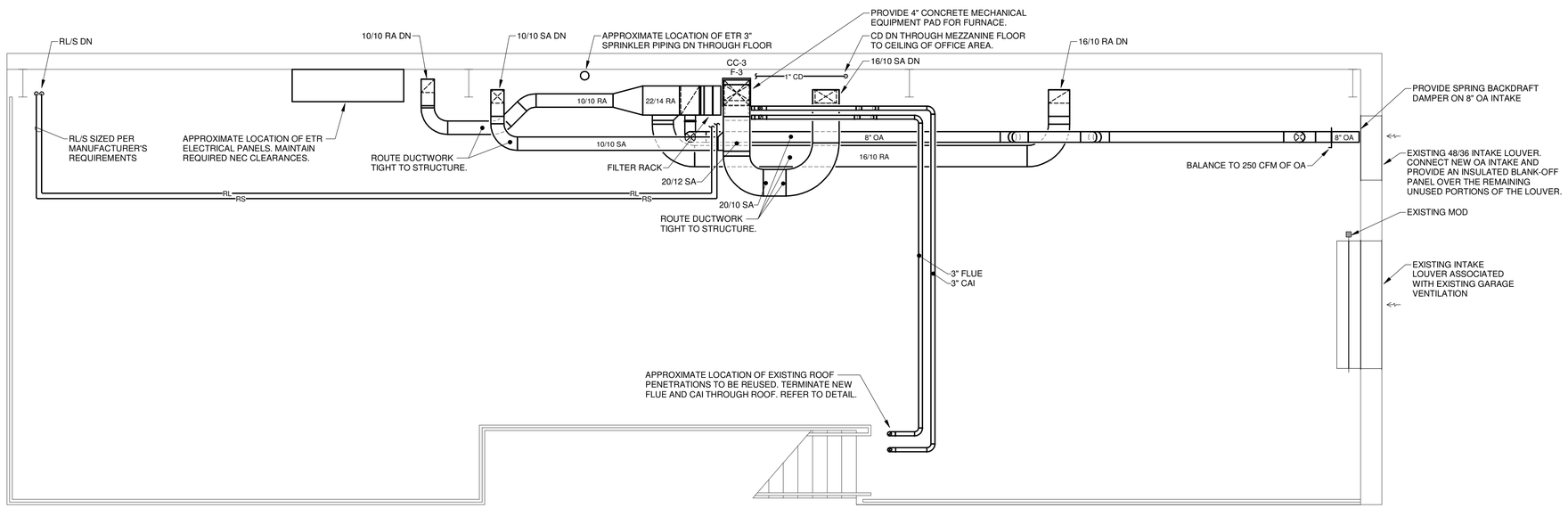

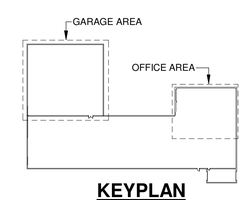

KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

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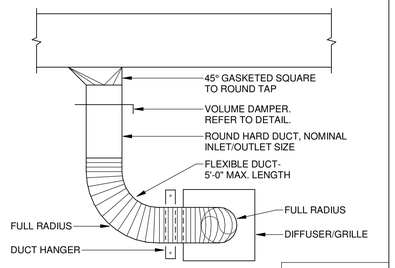
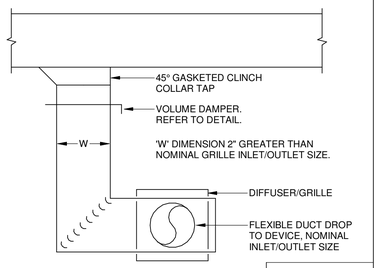
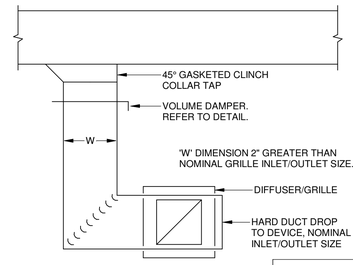


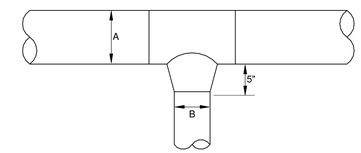
ROUND DUCT CONNECTION



RECTANGULAR DUCT CONNECTION (ROUND NECK)

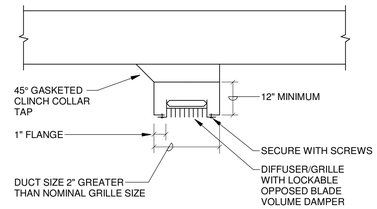


RECTANGULAR DUCT CONNECTION (RECTANGULAR NECK)

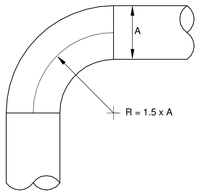


NOTE: 'B' NO LARGER THAN 'A' LESS 2"

ROUND TO ROUND DUCT TAKE-OFF CONICAL TEE

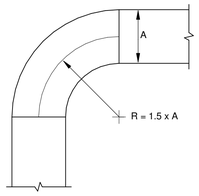


EXPOSED DUCT CONNECTION

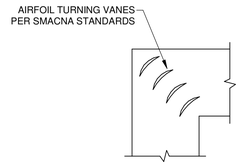


NOTE: 'A' EQUALS DUCT DIAMETER

ROUND 90° DUCT ELBOW

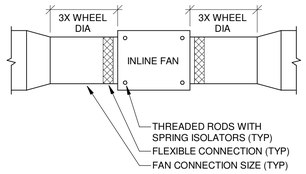


RECTANGULAR 90° RADIUS DUCT ELBOW

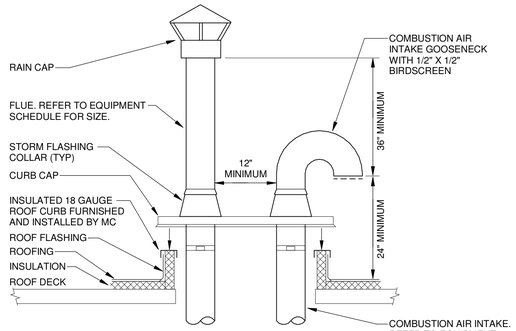


NOTES:
2" RADIUS VANES - DUCT WIDTH TO 12"
4" RADIUS VANES - DUCT WIDTH 13" AND ABOVE.

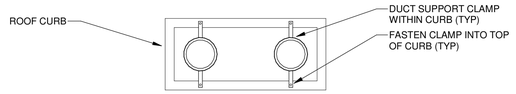
RECTANGULAR 90° DUCT ELBOW WITH TURNING VANES



INLINE FAN
SCALE: NONE



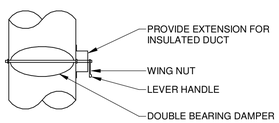
ELEVATION VIEW



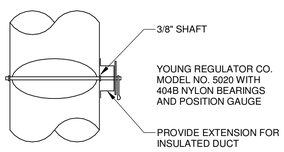
PLAN VIEW

NOTE:
1. VERIFY AND ADJUST ALL DIMENSIONS PER THE INSTALLED APPLIANCE'S REQUIREMENTS.

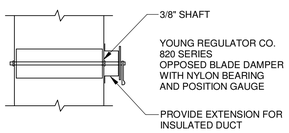
GUH, F, DWH FLUE/CAI ROOF TERMINATION DETAIL
SCALE: NONE



8" DIAMETER AND SMALLER



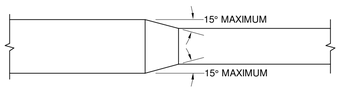
10" DIAMETER AND LARGER



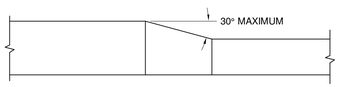
RECTANGULAR DUCT

REFERENCE SPECIFICATION FOR ADDITIONAL REQUIREMENTS AND FOR REMOTE CABLE CONTROL, REQUIRED WHERE DAMPER IS INACCESSIBLE

VOLUME DAMPERS



CONCENTRIC RECTANGULAR



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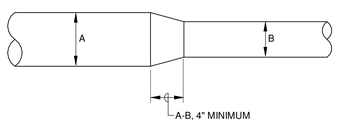
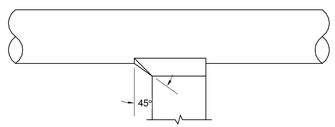
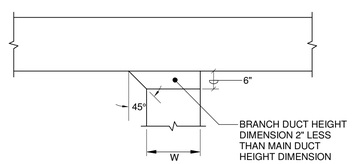


ROUND DUCT TRANSITION

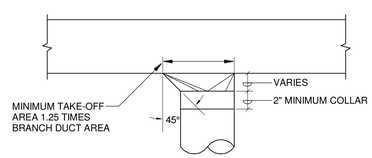
RECTANGULAR AND ROUND DUCT TRANSITION



ROUND TO RECTANGULAR

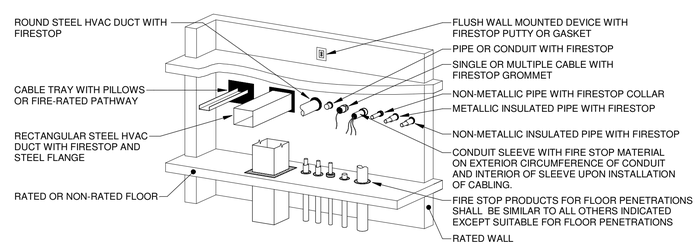


RECTANGULAR TO RECTANGULAR



RECTANGULAR TO ROUND

DUCT TAKE-OFFS



NOTES:
1. REFER TO UL FIRE RESISTANCE DIRECTORY FOR COMPLETE INSTALLATION REQUIREMENTS.
2. IN AN OCCUPIED BUILDING, PERMANENT FIRESTOPPING SHALL BE INSTALLED WITHIN 24 HOURS OF PENETRATING A FIRE-RATED ASSEMBLY. IF PERMANENT FIRESTOPPING CANNOT BE INSTALLED WITHIN THIS TIME PERIOD, TEMPORARY FIRESTOP PILLOWS/ BLOCKS ARE PERMITTED, WHERE INSTALLATION ALLOWS, UNTIL PERMANENT FIRESTOP MATERIALS CAN BE PROPERLY INSTALLED.

FIRESTOPPING DETAIL
SCALE: NONE

REVISIONS:

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HVAC DETAILS AND DIAGRAMS

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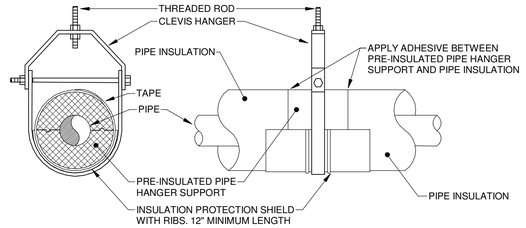
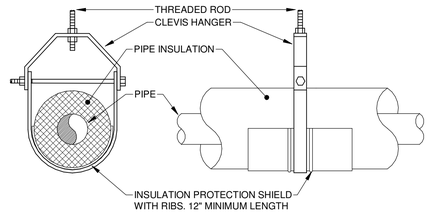


NOTES:
1. WHEN INSTALLED USING A TRAPEZE HANGER OR OTHER TYPE OF SUPPORT, LOCATE HANGER OR SUPPORT AND PIPE CLAMP IN SAME LOCATION AS CLEVIS HANGER.
2. PRE-INSULATED PIPE HANGER SUPPORT SHALL MATCH ADJACENT PIPE INSULATION.
3. INSULATION SYSTEM SHALL BE CONTINUOUS THROUGH HANGER WITH VAPOR SEAL INTEGRITY MAINTAINED THROUGHOUT THE ENTIRE SYSTEM.

CLOSED-CELL INSULATION



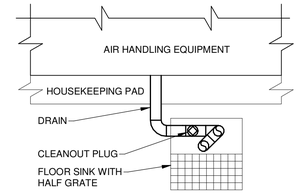
NOTES:
1. WHEN INSTALLED USING A TRAPEZE HANGER OR OTHER TYPE OF SUPPORT, LOCATE HANGER OR SUPPORT, PIPE CLAMP AND PROTECTION SHIELD IN SAME LOCATION AS CLEVIS HANGER.
2. INSULATION PROTECTION SHIELD DIAMETER SHALL MATCH INSULATION OUTSIDE DIAMETER.
3. INSULATION SYSTEM SHALL BE CONTINUOUS THROUGH SHALL BE CONTINUOUS THROUGH HANGER WITH VAPOR SEAL INTEGRITY MAINTAINED THROUGHOUT THE ENTIRE SYSTEM.

FIBERGLASS INSULATION - PIPING 2" AND SMALLER

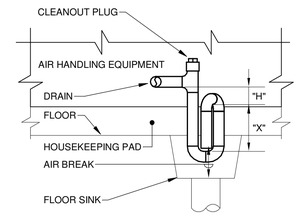
NOTE:
ALL ABOVE DETAILS MAY NOT APPLY TO THE PROJECT. PIPE INSULATION TYPE AND PIPE SIZE SHALL DETERMINE WHICH DETAILS APPLY. REFER TO SPECIFICATIONS.

HVAC - INSULATED PIPE HANGER DETAILS

SCALE: NONE



PLAN



ELEVATION

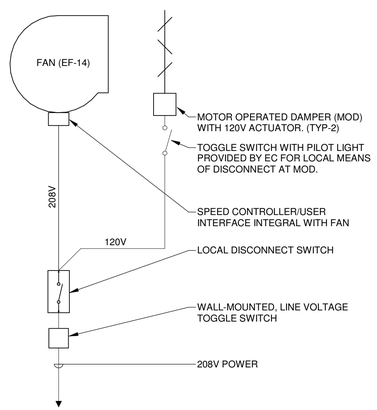
TRAP DIMENSIONS

COIL DISCHARGE STATIC PRESSURE ("WC)	"H" (IN)	"X" (IN)
+1.5	1.0	2.5
+2.0	1.0	3.0
+2.5	1.0	3.5
+3.0	1.0	4.0
+3.5	1.0	4.5
+4.0	1.0	5.0
+4.5	1.0	5.5
+5.0	1.0	6.0
+5.5	1.0	6.5
+6.0	1.0	7.0

NOTES:
1. THIS DETAIL REFERS TO A FLOOR MOUNTED AIR HANDLING UNIT INSTALLED ON A CONCRETE HOUSEKEEPING PAD.
2. WHERE UNIT IS SUSPENDED, PROVIDE TRAP AS DIMENSIONED. EXTEND DISCHARGE TO NEAREST FLOOR DRAIN AND TERMINATE WITH AN AIR BREAK.
3. WHERE AN AC CONDENSATE PUMP IS REQUIRED, PROVIDE TRAP AS DIMENSIONED. EXTEND DISCHARGE TO AND TERMINATE AT PUMP COLLECTION TANK.
4. TRAP SHALL BE CONSTRUCTED WITH DIMENSIONS AS INDICATED IN THE TABLE ABOVE. COIL DISCHARGE STATIC PRESSURE LISTED IN THE TABLE IS AT THE POINT IMMEDIATELY DOWNSTREAM OF THE COOLING COIL. REFER TO EQUIPMENT SCHEDULE. WHERE NOT SCHEDULED, STATIC PRESSURE SHALL BE MEASURED BY THE CONTRACTOR IN THE FIELD, AFTER STARTUP. WHERE MEASURED, ADD 1.0" WC TO ACCOUNT FOR DIRTY FILTERS.
5. HORIZONTAL DRAIN PIPING SHALL SLOPE AT A MINIMUM OF 1/4" PER FOOT.
6. WHERE NOT SCHEDULED, DRAIN PIPE SIZE SHALL MATCH UNIT CONNECTION SIZE.
7. WHERE SPACE IS AVAILABLE, LOCATE TRAP ABOVE FLOOR SINK.

INDOOR COOLING COIL CONDENSATE TRAP DETAIL

(POSTITIVE STATIC PRESSURE - BLOWTHRU) SCALE: NONE

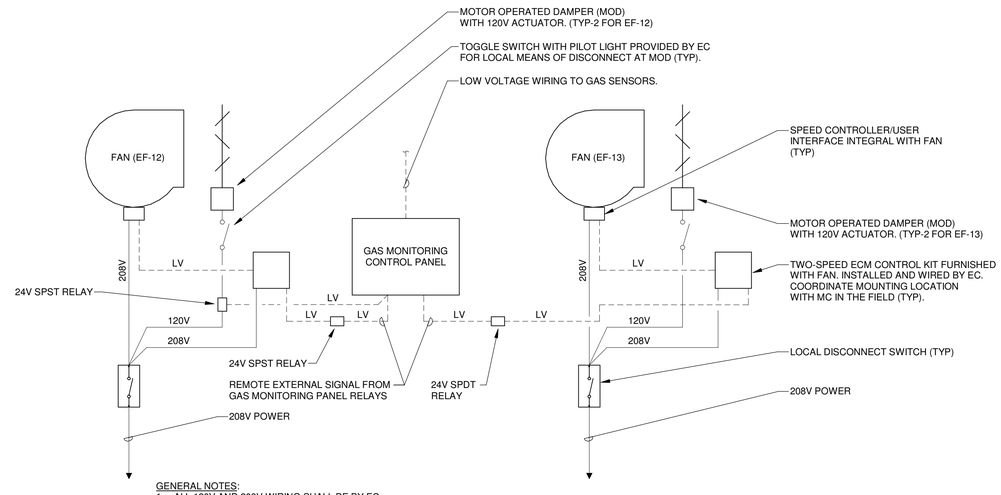


GENERAL NOTES:
1. ALL WIRING SHALL BE BY EC.
2. LOCAL DISCONNECT SWITCH IS EITHER INTEGRAL TO FAN OR BY EC. SEE FAN SCHEDULE AND COORDINATE WITH EC.
3. SYSTEM SHALL BE WIRED SUCH THAT THE MOD(S) OPENS WHEN THE FAN OPERATES.

CONTROL NOTES:
1. EF-14 SHALL RUN CONTINUOUSLY.

FAN (ECM) WITH MOD WIRING AND CONTROL DIAGRAM

NO BAS / LINE VOLTAGE CONTROL (EF-14) SCALE: NONE



GENERAL NOTES:
1. ALL 120V AND 208V WIRING SHALL BE BY EC.
2. ALL LOW VOLTAGE (LV) WIRING SHALL BE BY MC.
3. LOCAL DISCONNECT SWITCH IS EITHER INTEGRAL TO FAN OR BY EC. SEE FAN SCHEDULE AND COORDINATE WITH EC.
4. SYSTEM SHALL BE WIRED SUCH THAT THE MOD OPENS WHEN THE FAN OPERATES.
5. REFER TO FLOOR PLANS FOR QUANTITY OF GAS SENSORS.
6. MECHANICAL CONTRACTOR SHALL COORDINATE WITH THE BALANCING CONTRACTOR AND ENSURE THAT THE FANS ARE BALANCED TO THE CORRECT AIRFLOW AT EACH OPERATING CONDITION (VIA FAN'S AIR BALANCE KIT).

CONTROL NOTES:
1. DURING NORMAL OPERATION, EF-13 SHALL RUN CONTINUOUSLY AT ITS LOWER AIRFLOW OF 500 CFM (50%) WITH ASSOCIATED MODs OPEN. DURING NORMAL OPERATION, EF-12 SHALL BE OFF WITH ASSOCIATED MODs CLOSED.
2. WHEN GAS MONITORING SYSTEM SENSES ELEVATED LEVELS OF CO OR NO2, THE MONITORING SYSTEM SHALL ISSUE AN ALARM AND SIGNAL THE EFs INTO ALARM OPERATION. DURING ALARM OPERATION, EF-13 SHALL RUN CONTINUOUSLY AT ITS HIGHER AIRFLOW OF 1000 CFM (100%) WITH ASSOCIATED MODs OPEN. DURING ALARM OPERATION, EF-12 SHALL OPERATE AT ITS AIRFLOW OF 3700 CFM (100%) WITH ASSOCIATED MODs OPEN.

FAN (ECM) WITH MOD WIRING AND CONTROL DIAGRAM

NO BAS / LOW VOLTAGE CONTROL (EF-12, EF-13) SCALE: NONE

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MOTTIS & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
CONOR P. ECKHARDT
E-86424
REGISTERED PROFESSIONAL ENGINEER

THIS DWG :
HVAC DETAILS AND DIAGRAMS

COMM 17186
DATE 02-24-2022

DWG
H-6.2

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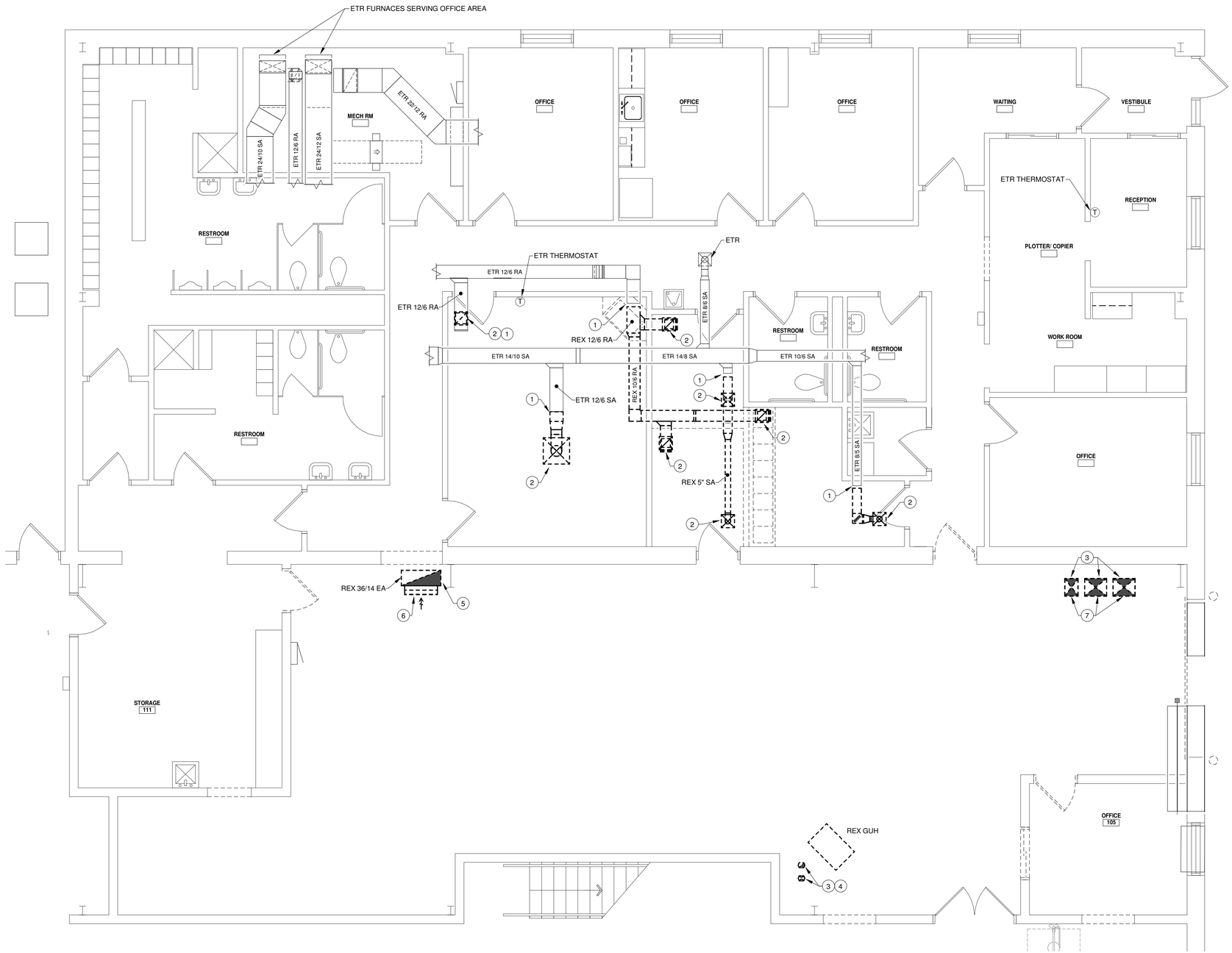

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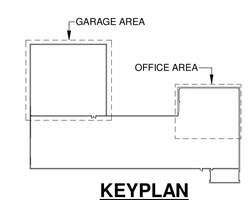
GENERAL NOTES:

A. EXISTING FURNACES SERVE SPACES THAT NEED TO REMAIN ACTIVE THROUGH CONSTRUCTION. SHUT-DOWN OF EQUIPMENT SHALL BE MINIMIZED. COORDINATE WITH OWNER.
B. CAP SUPPLY AIR AND RETURN AIR DUCTWORK DURING CONSTRUCTION OR PROVIDE TEMPORARY CONSTRUCTION FILTERS ON RETURN AIR DUCTWORK WITHIN THE RENOVATION AREA SERVED BY THE EXISTING TO REMAIN FURNACES.

PLAN NOTES

1 REMOVE EXISTING DUCTWORK BACK TO POINT INDICATED AND PREPARE FOR RECONNECTION.
2 REMOVE EXISTING DIFFUSER/GRILLE.
3 MECHANICAL CONTRACTOR SHALL INFILL MEZZANINE FLOOR. MATCH NEW/EXISTING CONDITIONS, AS APPLICABLE. COORDINATE WITH GENERAL CONTRACTOR.
4 REMOVE EXISTING FLUE AND COMBUSTION AIR INTAKE DUCTWORK.
5 NEW DUCTWORK SHALL REUSE EXISTING FLOOR PENETRATION. MECHANICAL CONTRACTOR SHALL INFILL REMAINING MEZZANINE FLOOR OPENING AFTER NEW DUCTWORK IS IN PLACE. REFER TO NEW WORK PLAN FOR FURTHER INFORMATION. MATCH NEW/EXISTING CONDITIONS, AS APPLICABLE. COORDINATE WITH GENERAL CONTRACTOR.
6 REMOVE EXISTING EXHAUST DUCTWORK AND ASSOCIATED GRILLES/DIFFUSERS. REMOVE ALL ASSOCIATED DUCTWORK THROUGH MEZZANINE LEVEL AND TO ROOF PENETRATION. REMOVE ASSOCIATED INLINE FAN EXHAUST FAN LOCATED ON MEZZANINE LEVEL. CAP EXISTING ROOF CURB WITH INSULATED BLANK-OFF PLATE.
7 REMOVE EXISTING OUTDOOR INTAKE DUCTWORK AND ASSOCIATED GRILLES/DIFFUSERS. REMOVE ALL ASSOCIATED DUCTWORK THROUGH MEZZANINE LEVEL AND TO LOUVER. REMOVE ASSOCIATED MOTOR OPERATED DAMPER AT LOUVER. CAP EXISTING LOUVER WITH INSULATED BLANK-OFF PLATE AND PREPARE FOR CONNECTION OF NEW OUTDOOR AIR DUCTWORK.



KEYPLAN
SCALE: NONE

SCALE: 1/4" = 1'-0"
0 2' 4' 6' 8'

600 MARKET AVENUE NORTH CANTON OHIO 44702

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E-86424
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THIS DWG :
OFFICE AREA HVAC DEMOLITION PLAN

COMM 17186
DATE 02-24-2022

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DRAWING LIST - ELECTRICAL

NUMBER	NAME
E-0.1	ELECTRICAL SYMBOL LEGEND AND GENERAL NOTES
E-0.2	LUMINAIRE SCHEDULE
E-0.3	MECHANICAL EQUIPMENT SCHEDULE
ED-1.1	GARAGE ELECTRICAL DEMOLITION PLAN
ED-1.2	OFFICE AREA ELECTRICAL DEMOLITION PLAN
ES-1.0	SITE ELECTRICAL DEMOLITION PLAN
ES-1.1	SITE ELECTRICAL PLAN
E-1.1	GARAGE LIGHTING PLAN
E-1.2	OFFICE AREA LIGHTING PLAN
E-2.1	GARAGE POWER AND FIRE ALARM PLAN
E-2.2	OFFICE AREA POWER AND FIRE ALARM PLAN
E-6.1	ELECTRICAL DETAILS AND DIAGRAMS
E-6.2	ELECTRICAL DETAILS AND DIAGRAMS
E-8.1	ELECTRICAL PANEL SCHEDULES

LEGEND - LIGHTING DEVICES

SYMBOL	DESCRIPTION
$	SWITCH (20A, 120/277V, SINGLE POLE) AT 44" CL AFF, UON
$	LOW VOLTAGE CONTROL STATION - WALL MOUNTED AT 44" CL AFF, UON
V	LIGHTING CONTROL VACANCY SENSOR - WALL MOUNTED AT 44" CL AFF, UON
V	LIGHTING CONTROL VACANCY SENSOR - CEILING MOUNTED
LRP	LIGHTING CONTROL PANEL, SEE DRAWINGS FOR DESCRIPTION

VACANCY SENSOR TYPE SCHEDULE

LABEL	DESCRIPTION
LDC	DUAL TECHNOLOGY, LOW VOLTAGE LIGHTING CONTROL SYSTEM
PS	PASSIVE INFRARED, SINGLE LEVEL SWITCHING, TWO LEVEL DETECTION, MOUNTED AT 44" AFF, UON
PSD	PASSIVE INFRARED, DIMMING, TWO LEVEL DETECTION, MOUNTED AT 44" AFF, UON

LOW VOLTAGE CONTROL STATION TYPE SCHEDULE

LABEL	DESCRIPTION
L	LOW VOLTAGE CONTROL STATION, ON/OFF, 1 ZONE
LD	LOW VOLTAGE CONTROL STATION, ON/OFF, RAISE/LOWER, 1 ZONE
LD2	LOW VOLTAGE CONTROL STATION, ON/OFF, RAISE/LOWER, 2 ZONES

LEGEND - ELECTRICAL DEVICES

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE (20A, 125V) TAMPER-RESISTANT SAFETY TYPE AT 18" AFF, UON
	DOUBLE DUPLEX RECEPTACLE (20A, 125V) TAMPER-RESISTANT SAFETY TYPE AT 18" AFF, UON, TYPE AS INDICATED ON DRAWINGS
	DUPLEX RECEPTACLE (20A, 125V) GROUND-FAULT CIRCUIT INTERRUPTER, TAMPER-RESISTANT SAFETY TYPE AT 18" AFF, UON
	DUPLEX RECEPTACLE (20A, 125V) GROUND-FAULT CIRCUIT INTERRUPTER, TAMPER-RESISTANT SAFETY TYPE MOUNTED 8" ABOVE COUNTER, UON
J	JUNCTION BOX - MOUNTING HEIGHT AND SIZE AS REQUIRED BY CODE OR AS NOTED ON DRAWINGS
	COMBINATION IN FLOOR POWER / DATA / A/V DEVICE. FLOOR BOX, CONDUIT, POWER DEVICE AND RELATED POWER WIRING PROVIDED BY EC. FOR ADDITIONAL INFORMATION, REFER TO FLOORBOX AND POKE THROUGH SCHEDULE AND DETAILS.
	NON-FUSED DISCONNECT SWITCH IN AN ENCLOSURE
$MS	MANUAL MOTOR STARTER - SURFACE MOUNTED

LEGEND - FIRE ALARM DEVICES

SYMBOL	DESCRIPTION
FACU	FIRE ALARM CONTROL UNIT - WALL MOUNTED AT 72" AFF TO TOP, UON
F	FIRE ALARM PULL STATION AT 44" AFF TO OPERATING HANDLE, UON
	FIRE ALARM AUDIBLE/VISUAL DEVICE. ROUGH-IN SUCH THAT THE ENTIRE LENS IS BETWEEN 80" AFF - 96" AFF
	FIRE ALARM AUDIBLE/VISUAL DEVICE - CEILING MOUNTED
S	FIRE ALARM SMOKE DETECTOR - CEILING MOUNTED

LEGEND - ELECTRICAL DISTRIBUTION

SYMBOL	DESCRIPTION
	PANELBOARD (208Y/120V, 3Ø, 4 WIRE)
DP-X	DISTRIBUTION PANELBOARD (208Y/120V, 3Ø, 4 WIRE)
GEN	GENERATOR

GENERAL ABBREVIATIONS

ABBREVIATION	DESCRIPTION
A	AMPERES
ADA	AMERICANS WITH DISABILITIES ACT
AF	AMP FUSED
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AS	AMP SWITCH
BAS	BUILDING AUTOMATION SYSTEM
BFF	BELOW FINISHED FLOOR
C/B	CIRCUIT BREAKER
CCT	CORRELATED COLOR TEMPERATURE
CM	CONSTRUCTION MANAGER
EC	ELECTRICAL CONTRACTOR
EMT	ELECTRICAL METALLIC TUBING
ETR	EXISTING ELECTRICAL DEVICE TO REMAIN
GC	GENERAL CONTRACTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER - PERSON PROTECTION
GFP	GROUND FAULT PROTECTION
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
IG	ISOLATED GROUND
KWC	KILOWATTS CONNECTED
KWD	KILOWATTS DEMAND
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
NEC	NATIONAL ELECTRICAL CODE
NEX	REMOVE EXISTING ELECTRICAL DEVICE AND INSTALL NEW ELECTRICAL DEVICE IN EXISTING OUTLET BOX. REFER TO NEW FLOOR PLANS FOR NEW DEVICE TYPE AND WIRING REQUIREMENTS. PROVIDE NEW COVERPLATE.
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
OBC	OHIO BUILDING CODE
PC	PLUMBING CONTRACTOR
ø	PHASE
RD	NEW LOCATION OF RELOCATED ELECTRICAL DEVICE
REX	REMOVE EXISTING ELECTRICAL DEVICE ALONG WITH RELATED CONDUIT AND WIRING, UON
RR	REMOVE AND RELOCATE EXISTING ELECTRICAL DEVICE AS SHOWN OR AS NOTED ON DRAWINGS
TC	TECHNOLOGY CONTRACTOR
TCC	TEMPERATURE CONTROL CONTRACTOR
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
V	VOLTS
W	WIRE
WP	WEATHERPROOF

EQUIPMENT ABBREVIATION SCHEDULE

ABBREVIATION	EQUIPMENT DESCRIPTION	VOLTAGE	APPARENT LOAD	MOUNTING HEIGHT	NOTES
CF	COFFEE MACHINE	120 V	1.2 kW		VERIFY FINAL HEIGHT WITH ARCHITECTURAL ELEVATIONS.
MW	MICROWAVE	120 V	1.6 kW		VERIFY FINAL HEIGHT WITH ARCHITECTURAL ELEVATIONS.
OH	OVERHEAD DOOR	120 V	1.2 kW		REFER TO OVERHEAD DOOR DETAILS FOR ADDITIONAL INFORMATION. COORDINATE EXACT REQUIREMENTS IN FIELD WITH DOOR SUPPLIER.
RF	REFRIGERATOR	120 V	1.0 kW	44"	PROVIDE 20/1 GFCI BREAKER AT THE PANEL. PROVIDE ENGRAVED RECEPTACLE COVERPLATE "GFCI BREAKER PROTECTED, PANEL XX #XX".
TV	TELEVISION	120 V	0.4 kW	72"	MOUNTED NEXT TO VIDEO OUTLET.

POWER CIRCUITING GUIDE

SYMBOL	DESCRIPTION
XXX X:1	X:1 — POWER CIRCUITING DESIGNATION X: PANEL NAME 1: CIRCUIT NUMBER XXX — DEVICE, JUNCTION BOX, FLOOR BOX, ETC. EQUIPMENT ABBREVIATION, REFER TO EQUIPMENT ABBREVIATION SCHEDULE FOR ADDITIONAL INFORMATION

LIGHTING CIRCUITING GUIDE

SYMBOL	DESCRIPTION
B X:1	X:1 — LIGHTING CIRCUITING DESIGNATION X: PANEL NAME 1: CIRCUIT NUMBER a,b: LIGHTING CONTROL ZONE - STAND ALONE LIGHTING CONTROL z#: ZONE CONTROLLER CONTROL - LOW VOLTAGE LIGHTING CONTROL SYSTEM #: INDIVIDUAL ZONE CONTROL x: LOCAL ROOM ZONE CONTROL B — LIGHTING DESIGNATION REFER TO LUMINAIRE SCHEDULE
SYMBOL	DESCRIPTION
	LUMINAIRE DESIGNATED AS NIGHT LIGHT WITH NO LIGHTING CONTROL FOR EGRESS - AT CEILING, RECESSED OR SURFACE MOUNTED

ONE LINE DIAGRAM LEGEND

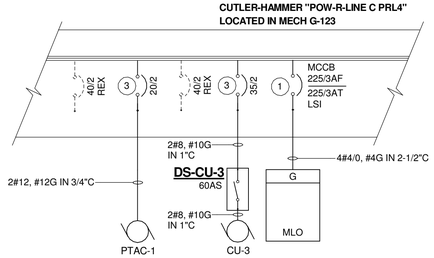
SYMBOL	DESCRIPTION
	BRANCH PANELBOARD
800/3 AF 800/3 AT	MOLDED CASE CIRCUIT BREAKER WITH ADJUSTABLE TRIP PLUG
	UNFUSED DISCONNECT SWITCH IN AN ENCLOSURE

CONDUIT SYMBOL LEGEND

SYMBOL	DESCRIPTION
	CONDUIT STUB
	CONDUIT TURNED DOWN
	CONDUIT TURNED UP
	CONDUIT INSTALLED BELOW GRADE OR FINISHED FLOOR
E-1 / E-1	ELECTRICAL CONNECTION TO EQUIPMENT ITEM 'E-1' (LETTER DESIGNATION AS APPLICABLE) - SEE CORRESPONDING EQUIPMENT CONNECTION SCHEDULE

(2) MDP (ETR)

208/120V, 3Ø, 4W, 800A
CUTLER-HAMMER "POW-R-LINE C PRL4"
LOCATED IN MECH G-123



ONE LINE DIAGRAM

SCALE: NONE

(X) PLAN NOTES

1. PROVIDE NEW CIRCUIT BREAKER IN EXISTING SPACE. PROVIDE CUTLER-HAMMER TYPE JD 35K CIRCUIT BREAKER.
2. MDP IS SERVED BY EXISTING 80KW, EMERGENCY STANDBY GENERATOR AND ASSOCIATED 800A AUTOMATIC TRANSFER SWITCH.
3. PROVIDE NEW CIRCUIT BREAKER IN LOCATION OF REMOVED 40A/2P BREAKER.

GENERAL ELECTRICAL NOTES:

A. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS, OR SHAFTS SHALL BE SEALED IN ACCORDANCE WITH ELECTRICAL FIRESTOPPING SPECIFICATIONS.

B. CONTRACTOR SHALL COORDINATE LOCATIONS OF ALL LUMINAIRES AND CEILING MOUNTED DEVICES WITH THE ARCHITECTURAL REFLECTED CEILING PLANS, ELEVATIONS, SECTIONS AND DETAILS. CONTRACTOR SHALL ALSO COORDINATE LOCATIONS OF RECEPTACLES AND OTHER WALL MOUNTED DEVICES WITH THE ARCHITECTURAL WALL ELEVATIONS AND FINISHES.

C. THE ROUTING OF ALL SURFACE MOUNTED/EXPOSED CONDUIT IN UNFINISHED AREAS (OR WHERE NOTED ON THE DRAWINGS) SHALL BE COORDINATED WITH, AND SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

D. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR. EXACT ELECTRICAL REQUIREMENTS SHALL BE VERIFIED IN THE FIELD WITH THE EQUIPMENT'S NAMEPLATE DATA. THE CONTRACTOR SHALL MAKE APPROPRIATE ADJUSTMENTS TO WIRE AND FUSE SIZES IN ACCORDANCE WITH THE NAMEPLATE DATA.

E. ALL BRANCH CIRCUITS AND FEEDERS SHALL CONTAIN AN INSULATED GROUNDING CONDUCTOR IN ACCORDANCE WITH ELECTRICAL SERVICE AND POWER DISTRIBUTION SPECIFICATIONS. NEUTRAL CONDUCTORS SHALL NOT BE SHARED IN ACCORDANCE WITH ELECTRICAL BASIC MATERIALS AND METHODS SPECIFICATIONS.

F. THE DISCONNECTING MEANS FOR ALL MOTORS AND EQUIPMENT SHALL BE INSTALLED IN A "READILY ACCESSIBLE" LOCATION AND SHALL HAVE PROPER WORKING SPACE AS DEFINED IN NEC ARTICLE 100 AND 110.

G. UTILIZATION OF THE PHRASE "PROVIDED BY" WITHIN THE CONTEXT OF THESE DOCUMENTS SHALL EXPLICITLY REPRESENT "FURNISHED AND INSTALLED BY".

H. THE ELECTRICAL CONTRACTOR SHALL ASSUME REMOVING EXISTING CEILING TILES TO INSTALL NEW WORK AND REPLACING WITH EXISTING OR NEW CEILING TILES AS REQUIRED FOR THE INSTALLATION OF ALL WORK. THE AREAS INCLUDE SPACES IN THE NEW WORK AS INDICATED ON THE DRAWINGS AND AREAS NOT SHOWN WHERE THE CONTRACTOR IS REQUIRED TO INSTALL NEW WORK. DAMAGED TILES BY ELECTRICAL CONTRACTOR SHALL BE REPLACED TO MATCH EXISTING TILES AT ELECTRICAL CONTRACTOR'S EXPENSE.

I. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING NECESSARY FOR INSTALLATION OF NEW WORK. CUTTING OF A STRUCTURAL MEMBER IS PROHIBITED WITHOUT SPECIFIC WRITTEN PERMISSION FROM THE ARCHITECT.

GENERAL ELECTRICAL DEMOLITION NOTES:

A. ALL LUMINAIRES, DEVICES, AND MISCELLANEOUS EXISTING CONDITIONS SHOWN ON THE DEMOLITION PLANS ARE THE RESULT OF FIELD INSPECTIONS AND ARE NOT INTENDED TO REPRESENT EXACT FIELD CONDITIONS, BUT RATHER THE EXTENT OF ELECTRICAL DEMOLITION. THE ELECTRICAL CONTRACTOR SHALL FIELD VERIFY THE EXTENT OF DEMOLITION PRIOR TO SUBMITTING BID.

B. REMOVE AND/OR RELOCATE EXISTING ELECTRICAL DEVICES ON WALLS OR CEILINGS BEING REMOVED. COORDINATE SUCH CONDITIONS WITH ARCHITECTURAL DRAWINGS. SEE NEW FLOOR PLANS FOR NEW LOCATIONS OF EXISTING DEVICES BEING RELOCATED.

C. EXISTING CONDUITS, CIRCUITS OR SYSTEMS IN WALLS OR CEILINGS BEING REMOVED WHICH SERVE SURROUNDING UNREMODELED AREAS SHALL BE REWORKED AND MAINTAINED.

D. EXISTING CONDUITS, CIRCUITS OR SYSTEMS PASSING THROUGH THE REMODELED AREAS WHICH SERVE UNREMODELED AREAS SHALL REMAIN AND BE PROTECTED DURING DEMOLITION AND REMODELING. RELOCATE AND REROUTE IF REQUIRED.

E. CONTINUITY OF CIRCUITS INTERRUPTED BY REMOVAL OF ELECTRICAL DEVICES SHALL BE MAINTAINED. PROVIDE JUNCTION BOXES, CONDUIT, AND WIRING EXTENSIONS FOR RELOCATION TO ABOVE ACCESSIBLE CEILINGS.

F. EXISTING LUMINAIRES BEING RE-USED SHALL BE CLEANED AND RE-LAMPED.

G. RE-SUPPORT EXISTING CONDUIT AND CABLES WHICH REMAIN ABOVE CEILINGS PER NATIONAL, STATE, AND LOCAL CODES.

H. MAINTAIN CONTINUITY OF BRANCH CIRCUITS AND COMMUNICATION CIRCUITS TO ALL DEVICES AND LUMINAIRES SHOWN TO REMAIN (ETR). EXTEND AND MODIFY AS REQUIRED.

I. ALL NEW AND RELOCATED CONDUIT AND WIRING IN REMODELED AREAS SHALL BE CONCEALED UNLESS OTHERWISE NOTED. COORDINATE WITH ARCHITECT IN FIELD.

J. FOR ALL DEVICES AND LUMINAIRES BEING REMOVED (REX), REMOVE RELATED CONDUIT AND WIRING TO SOURCE. RE-LABEL EXISTING CIRCUIT BREAKERS AS "SPARE" WHEN LOAD IS COMPLETELY REMOVED OR REVISE LABEL ON PANEL DIRECTORY APPROPRIATELY.

K. WHERE ELECTRICAL DEVICES ARE DESIGNATED TO BE REMOVED, REMOVE DEVICES AND BACKBOXES AND PATCH/REPAIR WALLS, UNLESS OTHERWISE DIRECTED BY ARCHITECT.

L. EXISTING INTERIM LIFE SAFETY SYSTEMS, INCLUDING BUT NOT LIMITED TO, EMERGENCY EGRESS LIGHTING AND FIRE ALARM SYSTEMS SHALL BE MAINTAINED AND UNINTERRUPTED IN UN-REMODELED AREAS. MODIFICATIONS TO SUCH SYSTEMS SHALL BE CLOSELY COORDINATED WITH OWNER AS TO NOT DISRUPT CONTINUITY OF LIFE SAFETY FUNCTIONS TO OTHER FLOOR AND PHASED AREAS DURING BUILDING OCCUPANCY HOURS.

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MOTTO MEADOWS ARCHITECTS

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STATE OF OHIO
BRIAN J. DAVID
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ELECTRICAL SYMBOL LEGEND AND GENERAL NOTES

COMM 17186
DATE 02-24-2022

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E-0.1

GENERAL LUMINAIRE NOTES

A. FIRST MANUFACTURER'S NAME LISTED IN ACCEPTABLE MANUFACTURERS COLUMN IS BASIS OF THE DESIGN. ALTERNATE MANUFACTURERS LISTED SHALL HAVE SIMILAR LUMEN OUTPUT, DIMMING COMPATIBILITY, BEAM DISTRIBUTION, LED COLOR, ETC,, AND IS THE RESPONSIBILITY OF THE EC TO SUBMIT EQUIVALENT PRODUCTS.

B. ALTERNATES FOR LUMINAIRES WITHOUT EQUALS MUST BE PRE-APPROVED BY ENGINEER AND ARCHITECT PRIOR TO BID.

C. CATALOG SERIES ONLY INDICATED IN ACCEPTABLE MANUFACTURERS COLUMN. SUBMITTAL SHALL INCLUDE FULL MODEL NUMBER INCLUSIVE OF OPTIONS SPECIFIED. WHERE FULL CATALOG NUMBER IS PROVIDED IN ACCEPTABLE MANUFACTURERS COLUMN, AND IS IN CONFLICT WITH WRITTEN DESCRIPTION, THE WRITTEN DESCRIPTION SHALL TAKE PRECEDENCE.

GENERAL SITE LIGHTING NOTE

A. SITE LIGHTING POLES - POLES 20 FEET AND HIGHER SHALL BE PROVIDED WITH FACTORY INSTALLED VIBRATION DAMPERS. POLE MANUFACTURER SHALL PROVIDE POLES DESIGNED PER THE 2013 AASHTO LTS-6 3-SECOND GUST BASIC WIND SPEEDS WITH 1.14 GUST EFFECT FACTOR AND 25 YEAR DESIGN LIFE WIND MAP FOR THE AREA THE PROJECT IS LOCATED. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ADEQUATE SLACK IN THE WIRING AT THE BASE OF THE POLE TO COMPENSATE FOR WIND MOVEMENT. ALL POLES SHALL BE GROUNDED IN ACCORDANCE WITH THE NEC AND ANY OTHER LOCAL CODES, OR AS INDICATED ON THE POLE BASE DETAILS, WHICHEVER ARE MORE STRINGENT. THE BASE DETAILS INDICATED ON THE DRAWINGS SHALL BE USED AS GUIDES ONLY AS THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND TEMPLATE DRAWINGS MUST BE UTILIZED DURING INSTALLATION. ONLY THE BOLT AND NUT KITS SUPPLIED BY THE POLE MANUFACTURER SHALL BE USED. THE ELECTRICAL CONTRACTOR SHALL CONSULT WITH THE CIVIL CONTRACTOR AND SHOULD SOIL CONDITIONS BE QUESTIONABLE, THE BASE DIMENSIONS AND DEPTHS SHALL BE ADJUSTED AS RECOMMENDED BY THE STRUCTURAL ENGINEER.

LUMINAIRE SCHEDULE - LED

SYMBOL	TYPE	MOUNTING	LUMENS	CCT	CRI	DRIVER(S) TYPE	DRIVER(S) QTY	WATTAGE	VOLTAGE	LUMINAIRE DESCRIPTION	ACCEPTABLE MANUFACTURERS	NOTES
	ESW	SURFACE	N/A	N/A	N/A	N/A	N/A	2 W	UNIV	EMERGENCY LUMINAIRE WITH THERMOPLASTIC HOUSING, NICKEL CADMIUM BATTERY, 90 MINUTES MINIMUM BATTERY CAPACITY, BATTERY CHARGER, TEST SWITCH, INDICATOR LIGHT AND (2) ADJUSTABLE LAMP HEADS.	SURE-LITES APEL LITHONIA ELM2L DUAL-LITE EV EXITRONIX LED-90 EMERGI-LITE EL-2LED	
	HB2	SUSPENDED	13110	3500	83	0-10V	2	92 W	UNIV	20-3/16"Wx2-3/8"Dx4' LONG HIGH EFFICIENCY LUMINAIRE WITH ALUMINUM HOUSING, WIDE DISTRIBUTION, FROSTED ACRYLIC LENS, AND WHITE FINISH. PROVIDE RIGID STEM. BOTTOM OF LUMINAIRE SHALL BE FLUSH WITH BOTTOM OF ADJACENT BEAM.	METALUX HBLED.LD5 LITHONIA IBG COLUMBIA PEL4 DAYBRITE FBY GE CURRENT ABV3	2
	R3	RECESSED	4500	3500	85	0-10V	1	36 W	UNIV	2'x4'x5-11/16" DEEP LUMINAIRE WITH COLD ROLLED STEEL HOUSING, SQUARE CENTER ACRYLIC BASKET, AND BAKED MATTE WHITE ENAMEL FINISH.	METALUX 24RLN LITHONIA 2ALL4 COLUMBIA LSER24 DAYBRITE 2CAG HE WILLIAMS PT24	
	SLF	IN-GRADE	3067	4000	80	0-10V	1	15 W	UNIV	LED IN-GRADE LUMINAIRE, 13" DIAMETER X 10" DEEP WITH BLACK THERMAL PLASTIC HOUSING, ALUMINUM DEBRIS SHIELD MASK, SPOT DISTRIBUTION, SLIP RESISTANT LENS	KIM LIGHTING LTV81FF-SP-36L-4K-UV-SR-R CA81 LITHONIA LUMARK GARDCO	3
	SLG	IN-GRADE	1700	4000	70	ELECTRONIC	1	19 W	UNIV	13" DIAMETER x 16" DEEP LUMINAIRE WITH CAST ALUMINUM DOOR, STAINLESS STEEL HOUSING, GASKET, SPOT DISTRIBUTION, ANTI-SLIP LENS, ADJUSTABLE TILT AND IP68 RATING.	HYDREL M9710 LUMIERE WINONA BK LIGHTING PHILIPS	3
	SLP3	POLE	15033	3500	70	0-10V	1	129 W	UNIV	21-5/8"x21-3/4"x3-15/16" DEEP LUMINAIRE WITH ALUMINUM HOUSING, 7" ARM, TYPE III FORWARD THROW DISTRIBUTION, SPILL LIGHT OPTICAL CONTROL, 1000mA, INTEGRAL PHOTOCELL, AND BLACK FINISH. POLE SHALL BE 20' IN HEIGHT, ROUND TAPERED ALUMINUM WITH MATCHING FINISH. LUMINAIRE AVAILABLE WITH INTEGRAL PHOTOCELL, AND INTEGRAL SENSOR FOR DIMMING FOR ASHRAE COMPLIANCE.	MC-GRAW EDISON GLEON.600 POLE: MC-GRAW EDISON RTA, HAPCO, OR EQUIVALENT LITHONIA DSX2.LED BEACON VPL GARDCO PUREFORM CURRENT EALS.03	
	SLP4	POLE	15033	3500	70	0-10V	1	129 W	UNIV	21-5/8"x21-3/4"x3-15/16" DEEP LUMINAIRE WITH ALUMINUM HOUSING, 7" ARM, TYPE IV FORWARD THROW DISTRIBUTION, SPILL LIGHT OPTICAL CONTROL, 1000mA, INTEGRAL PHOTOCELL, AND BLACK FINISH. POLE SHALL BE 20' IN HEIGHT, ROUND TAPERED ALUMINUM WITH MATCHING FINISH. LUMINAIRE AVAILABLE WITH INTEGRAL PHOTOCELL, AND INTEGRAL SENSOR FOR DIMMING FOR ASHRAE COMPLIANCE.	MC-GRAW EDISON GLEON.600 POLE: MC-GRAW EDISON RTA, HAPCO, OR EQUIVALENT LITHONIA DSX2.LED BEACON VPL GARDCO PUREFORM CURRENT EALS.03	
	SLW1	SURFACE	2561	3500	70	0-10V	1	21 W	UNIV	7.5"x8"x3-5/8" DEEP WALL LUMINAIRE WITH ALUMINUM HOUSING, STAINLESS STEEL HARDWARE, SEALED AND GASKETED OPTICAL COMPARTMENT, INTEGRAL PHOTOCELL, INTEGRAL MOTION SENSOR WITH DIMMING, COLD WEATHER INTEGRAL EMERGENCY BATTERY PACK, AND FINISH AS SELECTED BY ARCHITECT.	LUMARK AXCS2A.PC. MSP/DIM-LXX LITHONIA QLWX1 HUBBELL SG1.30.PCU STONCO PW LSI LIGHTING WPSLS	
	SLW2	SURFACE	7594	3500	65	0-10V	1	56 W	UNIV	10.75"x11.5"x4-7/8" DEEP WALL LUMINAIRE WITH ALUMINUM HOUSING, STANLESS STEEL HARDWARD, SEALED AND GASKETED OPTICAL COMPARTMENT, INTEGRAL PHOTOCELL, AND FINISH AS SELECTED BY ARCHITECT.	LUMARK AXCL6A.PC. MSP/DIM-LXX.AHD245 LITHONIA DSXW1.LED.20C. 530.XX.PE.PIRX HUBBELL SG2.80.SCP TRACELITE WLZ LSI LIGHTING WPSLL	
	WA	SURFACE/ SUSPENDED	4100	3500	85	0-10V	1	48 W	UNIV	7-5/8"Wx2-1/2"Dx4' LONG LUMINAIRE WITH STEEL HOUSING, FROSTED ACRYLIC LENS, AND BAKED WHITE ENAMEL FINISH.	METALUX WNLED LITHONIA LBL4 COLUMBIA LAW DAYBRITE LBX HE WILLIAMS 17	
	XE	WALL	N/A	N/A	N/A	N/A	N/A	5 W	UNIV	EXIT SIGN WITH 6" HIGH RED LETTERS, WHITE POLYCARBONATE HOUSING, DUAL ADJUSTABLE HEADS, LEAD CALCIUM BATTERY, BATTERY CHARGER, TEST SWITCH, AND INDICATOR LIGHT. FACES, ARROWS AND MOUNTING AS INDICATED ON DRAWINGS.	SURE-LITES LPX LITHONIA LHQM DUAL-LITE HCX CHLORIDE VLLC EMERGI-LITE EF12D	1

LIGHTING CONTROL MATRIX

SPACE / FUNCTION ZONE	LIGHTING CONTROL LC1	LC2	AUTOMATIC CONTROL OS1	OS4	TC1	TC3	DAYLIGHT HARVESTING DH1	DH2	EGRESS CONTROL EM1	EM2	NOTES
INTERIOR											
BREAKROOM	X		X								
CONFERENCE ROOM	X		X								
CORRIDOR		X			X						
GARAGE / STOCK ROOM	X				X						
OFFICE - PRIVATE	X		X								
STORAGE ROOM		X	X								
EXTERIOR											
EXTERIOR DOORS						X		X		X	
PARKING						X		X			

CONTROLS LEGEND:

LC1 - ON/OFF AND CONTINUOUS DIMMING
LC2 - ON/OFF
OS1 - MANUAL ON AND 20-MINUTE TIME DELAY
OS4 - AUTO ON TO 100% AND 20-MINUTE TIME DELAY, DIM TO 50% WHEN INACTIVE AFTER TIME DELAY.
TC1 - TIME CLOCK CONTROL
TC3 - TIME CLOCK, LUMINAIRES SHALL BE DIMMED TO 70% BETWEEN MIDNIGHT OR BUSINESS CLOSING (WHICHEVER IS LATER) AND 6AM OR BUSINESS OPENING (WHICHEVER COMES FIRST).
DH1 - PRIMARY ZONE SETPOINT FOOTCANDLES (FC) TO IES RECOMMENDATION. LIGHTS TO DIM (ADJUSTABLE) WHEN DAYLIGHT IS ABLE TO PROVIDE SETPOINT FC. (WHERE INDICATED ON FLOOR PLANS)
DH2 - EXTERIOR PHOTOCELL CONTROL. LUMINAIRES SHALL TURN ON WHEN DAYLIGHT IS INSUFFICIENT. (WHERE INDICATED ON FLOOR PLANS)
EM1 - EGRESS LUMINAIRES TURN 'ON' UPON LOSS OF NORMAL POWER
EM2 - LUMINAIRES GO TO 100% UPON LOSS OF NORMAL POWER, AND/OR FIRE ALARM SIGNAL

NOTES:

RELAY PANEL SCHEDULE

RELAY PANEL: LRP **LOCATION: MECH/ELEC** **NOTES: SURFACE MOUNTED**

QUANTITY OF RELAYS: (8) Normal

DRAWING	RELAY	PANEL	CIRCUIT	LUMINAIRE TYPE	DESCRIPTION
ES-1.1	r1	MDP	44,46	SLP3	SITE POLE
ES-1.1	r1	MDP	44,46	SLP4	SITE POLE
ES-1.1	r2	MDP	34,36	SLW2	EXTERIOR WALL MOUNTED FIXTURES
ES-1.1	r3	MDP	34,36	SLW2	EXTERIOR WALL MOUNTED FIXTURES
ES-1.1	r4	MDP	34,36	SLW2	EXTERIOR WALL MOUNTED FIXTURES
ES-1.1	r5	MDP	34,36	SLW2	EXTERIOR WALL MOUNTED FIXTURES

LUMINAIRE SCHEDULE NOTES:

1. WALL MOUNTED EXIT SIGNS SHALL BE ABOVE DOORS, CENTERED BETWEEN DOOR AND CEILING WHERE PRACTICAL, OR AT A SIMILAR HEIGHT IF NOT ABOVE DOORS. MOUNT EMERGENCY BATTERY PACKS AT SIMILAR HEIGHT. EXIT SIGNS SHALL BE VISIBLE FOR EGRESS INDICATION.
2. PROVIDE ALL MOUNTING ACCESSORIES, INCLUDING JUNCTION BOXES, UNISTRUT AND THREADED RODS, FOR SUPPORT ABOVE CEILINGS AS RECOMMENDED BY THE MANUFACTURER. VERIFY EXACT INSTALLATION METHODS WITH MANUFACTURER PRIOR TO BIDDING. COORDINATE EXACT PENDANT AND AIRCRAFT CABLE LENGTHS REQUIRED WITH ARCHITECT'S FINAL LUMINAIRE ELEVATIONS. SUBMITTALS SHALL BE PROVIDED, INCLUDING 1/8" SCALE INSTALLATION DRAWINGS INDICATING LUMINAIRE LAYOUTS.
3. REFER TO BASE DETAILS IN DRAWINGS FOR ADDITIONAL INFORMATION.

ASHRAE 90.1-2010 LIGHTING COMPLIANCE DOCUMENTATION

INTERIOR AUTOMATIC LIGHTING CONTROL METHOD:
PROGRAMMABLE LIGHTING DIMMING SYSTEM, VACANCY SENSORS

INTERIOR LIGHTING POWER CALCULATION - CALCULATED USING SPACE-BY-SPACE METHOD
GROSS AREA OF BUILDING: 12518 SQUARE FEET
INTERIOR LIGHTING POWER ALLOWANCE: 9296 WATTS
CONNECTED INTERIOR LIGHTING POWER: 3296 WATTS

EXTERIOR AUTOMATIC LIGHTING CONTROL METHOD:
EXISTING LIGHTING CONTACTOR

EXTERIOR LIGHTING POWER CALCULATION:

LIGHTING ZONE: 2 - AREAS PREDOMINANTLY CONSISTING OF RESIDENTIAL, ZONING, NEIGHBORHOOD BUSINESS DISTRICTS, LIGHT INDUSTRIAL WITH LIMITED NIGHTTIME USE AND RESIDENTIAL MIXED USE AREAS

BASE SITE ALLOWANCE: ZONE 2 = 600W

TRADABLE + BASE SITE ALLOWANCE ≥ TRADABLE CONNECTED POWER
4500 W + 600 W ≥ 1724 W

FUNCTIONAL TESTING AND CERTIFICATION OF THE LIGHTING CONTROL SYSTEM SHALL BE PERFORMED BY: [OWNER'S REPRESENTATIVE, ADDRESS, PHONE NUMBER]
REFER TO SPECIFICATION SECTION 260810 *FUNCTIONAL TESTING OF LIGHTING CONTROLS* FOR ADDITIONAL INFORMATION.

REFER TO LUMINAIRE CONTROL MATRIX FOR ADDITIONAL INFORMATION AND REQUIREMENTS FOR COMPLIANCE.

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LUMINAIRE SCHEDULE

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MECHANICAL EQUIPMENT SCHEDULE

DRAWING	EQUIPMENT TAG ABBREV.	FLOOR	MARK	DESCRIPTION	VOLTAGE	PHASE	HP	FLA	KW	CONN.	WIRING	PANEL	CKT#	SWITCH OR STARTER RATINGS: SWITCH / FUSE / STARTER	REMARKS
E-2.2	CU		3	CONDENSING UNIT	208	1		20.1	4.2	WPDS				60AS	1
E-2.1	DWH		1	DOMESTIC WATER HEATER	120	1		1.7	0.2	R1	2#12, #12G IN 3/4"C	G	35		
E-2.1	EF		12	EXHAUST FAN	208	1	2	13.3	2.8	DS	2#12, #12G IN 3/4"C	G	10,12	30AS	2
E-2.1	EF		13	EXHAUST FAN	208	1	1/2	5.4	1.1	DS	2#12, #12G IN 3/4"C	G	14,16	30AS	2
E-2.1	EF		14	EXHAUST FAN	208	1	3/4	7.6	1.6	DS	2#12, #12G IN 3/4"C	G	18,20	30AS	2
E-2.1	EUH		1	ELECTRIC UNIT HEATER	208	1		14.4	3.0	DC	2#12, #12G IN 3/4"C	G	2,4		
E-2.2	F		3	FURNACE	120	1	1	9.8	1.2	TS	2#12, #12G IN 3/4"C	D	32		
E-2.1	GMCP		1	GAS MONITORING CONTROL PANEL	120	1		4.2	0.5	DC	2#12, #12G IN 3/4"C	G	36		2
E-2.1	GRH		1	GAS RADIANT HEATER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	22		
E-2.1	GRH		2	GAS RADIANT HEATER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	22		
E-2.1	GRH		3	GAS RADIANT HEATER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	22		
E-2.1	GRH		4	GAS RADIANT HEATER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	24		
E-2.1	GRH		5	GAS RADIANT HEATER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	24		
E-2.1	GUH		1	GAS UNIT HEATER	120	1	1/6	4.4	0.5	DC	2#12, #12G IN 3/4"C	G	7		
E-2.1	GUH		2	GAS UNIT HEATER	120	1	1/6	4.4	0.5	DC	2#12, #12G IN 3/4"C	G	7		
E-2.2	PTAC		1	PACKAGED TERMINAL AIR CONDITIONER	208	1		7.2	1.5	DC					1
E-2.1	PTAC		2	PACKAGED TERMINAL AIR CONDITIONER	208	1		7.2	1.5	DC	2#12, #12G IN 3/4"C	G	6,8		
E-2.1	TP		1	TRAP PRIMER	120	1		1.7	0.2	TS	2#12, #12G IN 3/4"C	G	33		

MECHANICAL EQUIPMENT SCHEDULE NOTES:

1. REFER TO ONE LINE DIAGRAM FOR WIRING INFORMATION.
2. REFER TO ASSOCIATED "FAN (ECM) WITH MOD WIRING AND CONTROL DIAGRAM" DETAIL ON SHEET H-6.2 FOR MORE INFORMATION.

MECHANICAL EQUIPMENT CONNECTION LEGEND

MECH CONNECTION	MECHANICAL CONNECTION DESCRIPTION
DC	DIRECT CONNECTION. PROVIDE JUNCTION BOX AND SEALTITE CONNECTION. (MECHANICAL EQUIPMENT FURNISHED WITH INTEGRAL MEANS OF DISCONNECT)
DS	UNFUSED DISCONNECT SWITCH
R1	PROVIDE NEMA 5-20R RECEPTACLE
TS	TOGGLE SWITCH, LOCKABLE, SINGLE POLE, SINGLE THROW, 20A, 1P
WPDS	WEATHERPROOF NON-FUSED DISCONNECT SWITCH

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STATE OF OHIO
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MECHANICAL EQUIPMENT SCHEDULE

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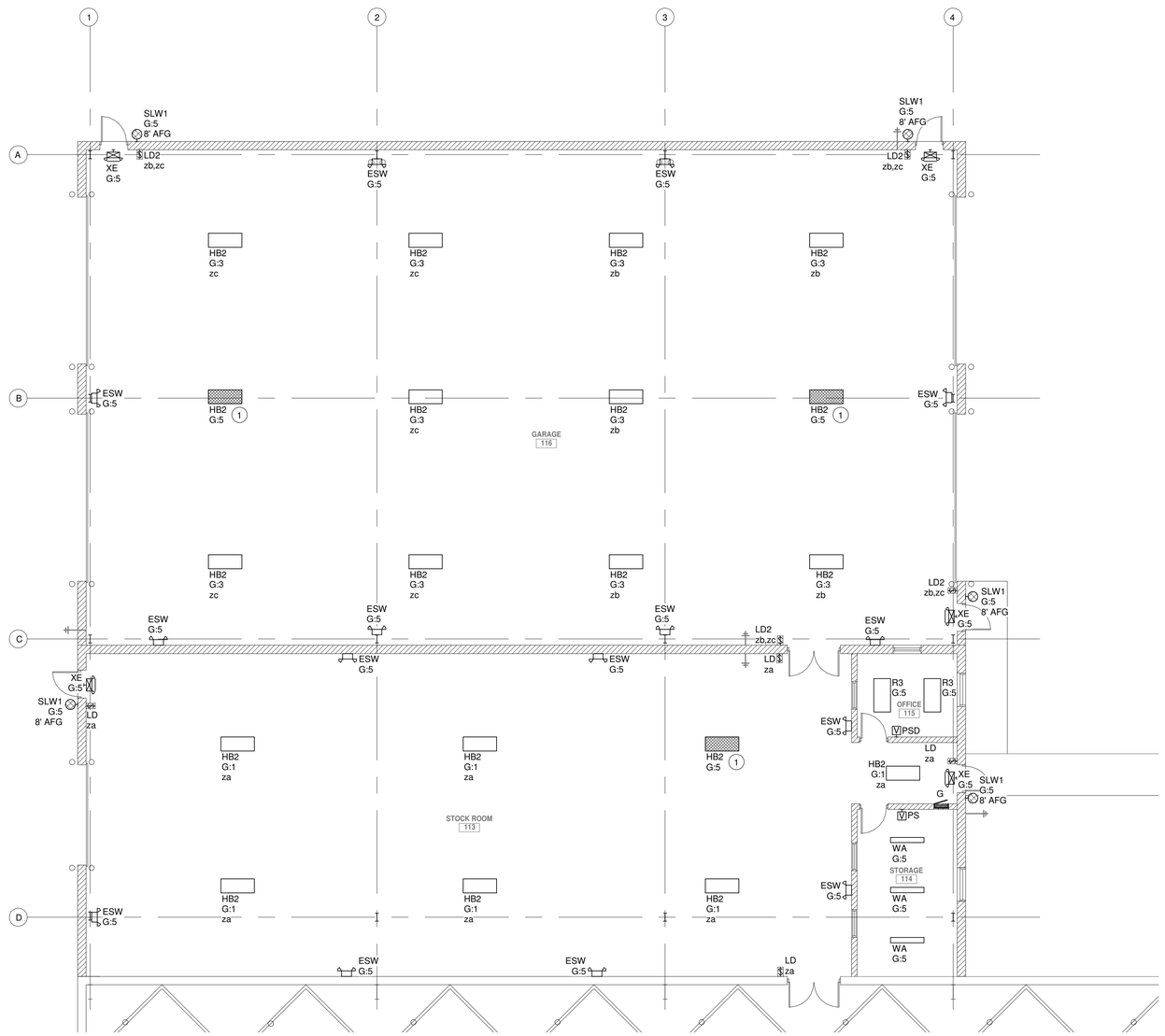
REVISIONS:

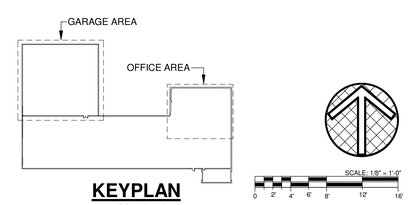
GENERAL NOTES:

A. ELECTRICAL DEVICES AND FIXTURES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN, ETR.
B. ENTIRE FACILITY ELECTRICAL DISTRIBUTION SYSTEM IS CONNECTED TO STAND-BY EMERGENCY GENERATOR. LOCAL, BATTERY BACKUP LUMINAIRES PROVIDED FOR EMERGENCY EGRESS ILLUMINATION.

PLAN NOTES

1 PROVIDE ADDITIONAL ZONE CONTROLLER WITH UL 924 LISTING FOR NIGHT LIGHT LUMINAIRES.





KEYPLAN
SCALE: NONE

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GARAGE LIGHTING PLAN

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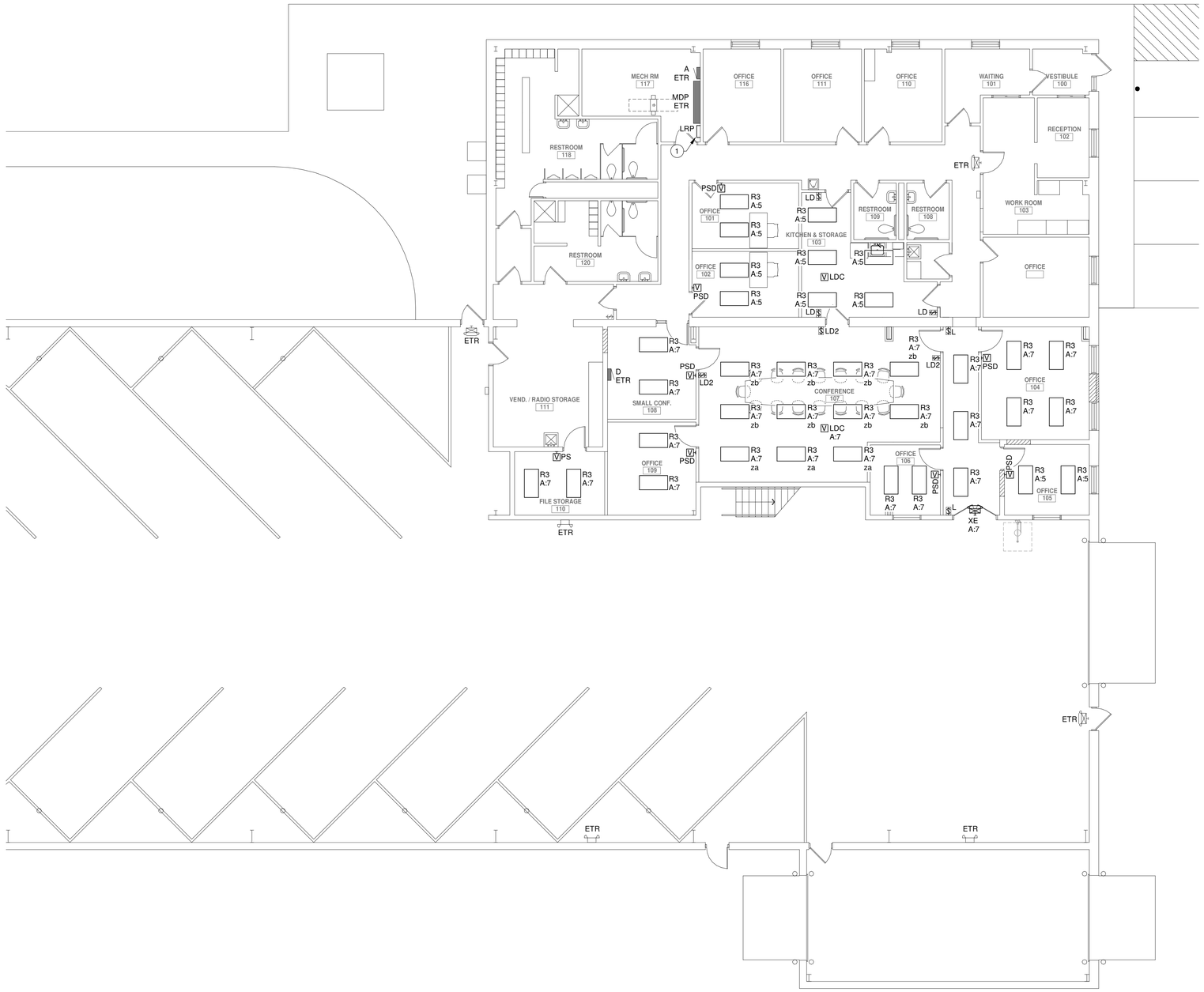
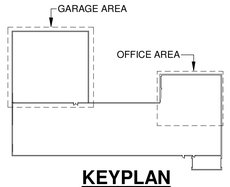


GENERAL NOTES:

A. ELECTRICAL DEVICES AND FIXTURES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN. ETR.
B. EC SHALL UTILIZE EXISTING AREA LIGHTING BRANCH CIRCUITS. EXTEND CIRCUITS INDICATED TO NEW FIXTURES.

PLAN NOTES

1 PROVIDE NEW LIGHTING RELAY PANEL "LRP": EC SHALL SHALL MAINTAIN EXISTING PATHWAY AND BRANCH WIRING TO EXTERIOR FIXTURES, UON. EC TO PROVIDE SPLICE BOX ADJACENT TO NEW RELAY PANEL. NO SPLICING SHALL BE LOCATED INSIDE DISTRIBUTION PANEL OR RELAY PANEL.



KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

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GENERAL NOTES:

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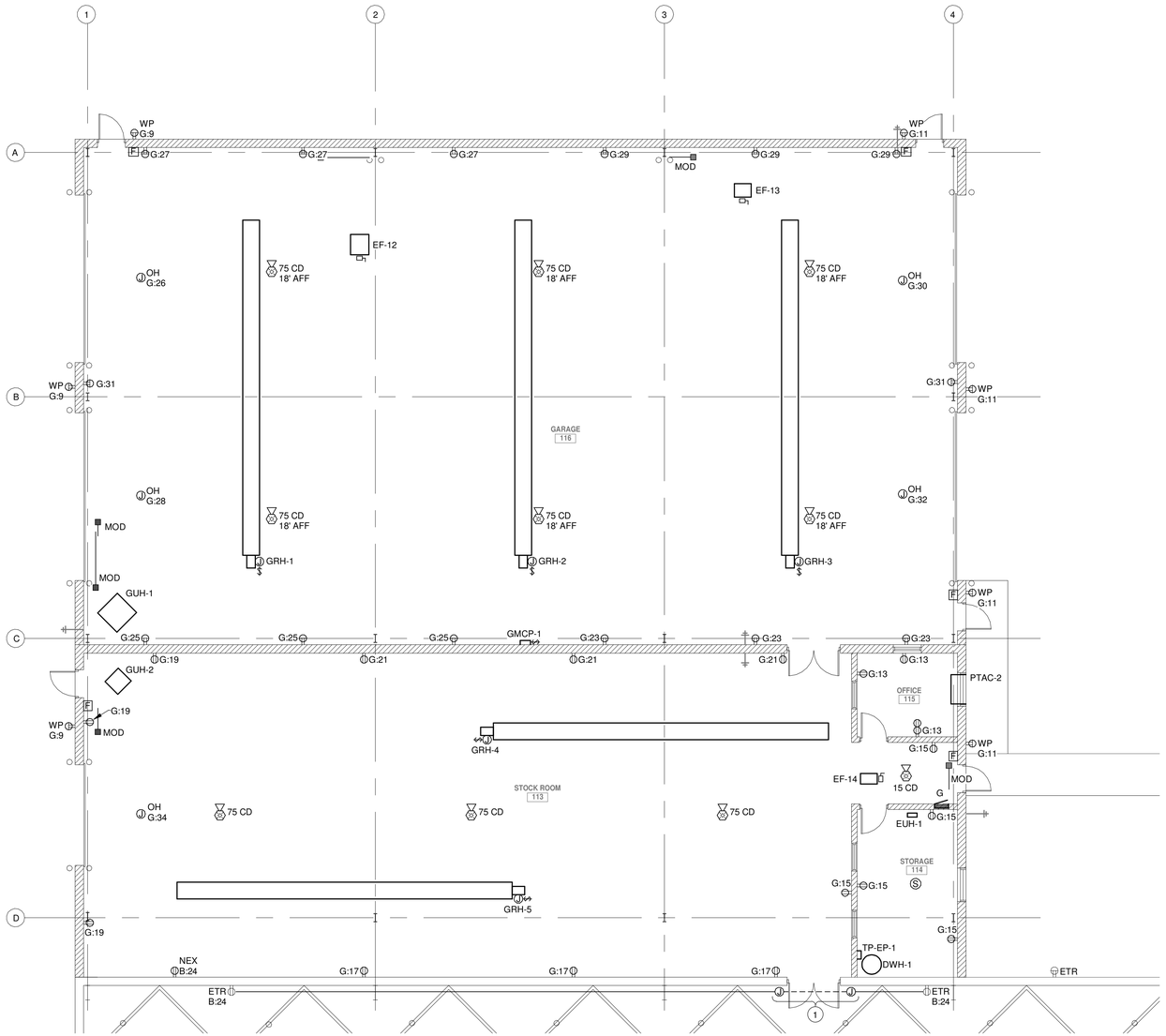
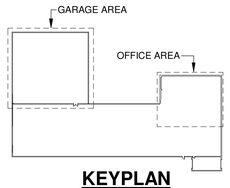


(X) PLAN NOTES

1 EC SHALL PROVIDE NEW SURFACE-MOUNTED BACKBOXES AND EXTEND 3/4" CONDUIT AND BRANCH CIRCUIT CONDUCTORS TO ALLOW INSTALLATION OF NEW DOORWAY.



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GARAGE POWER AND FIRE ALARM PLAN

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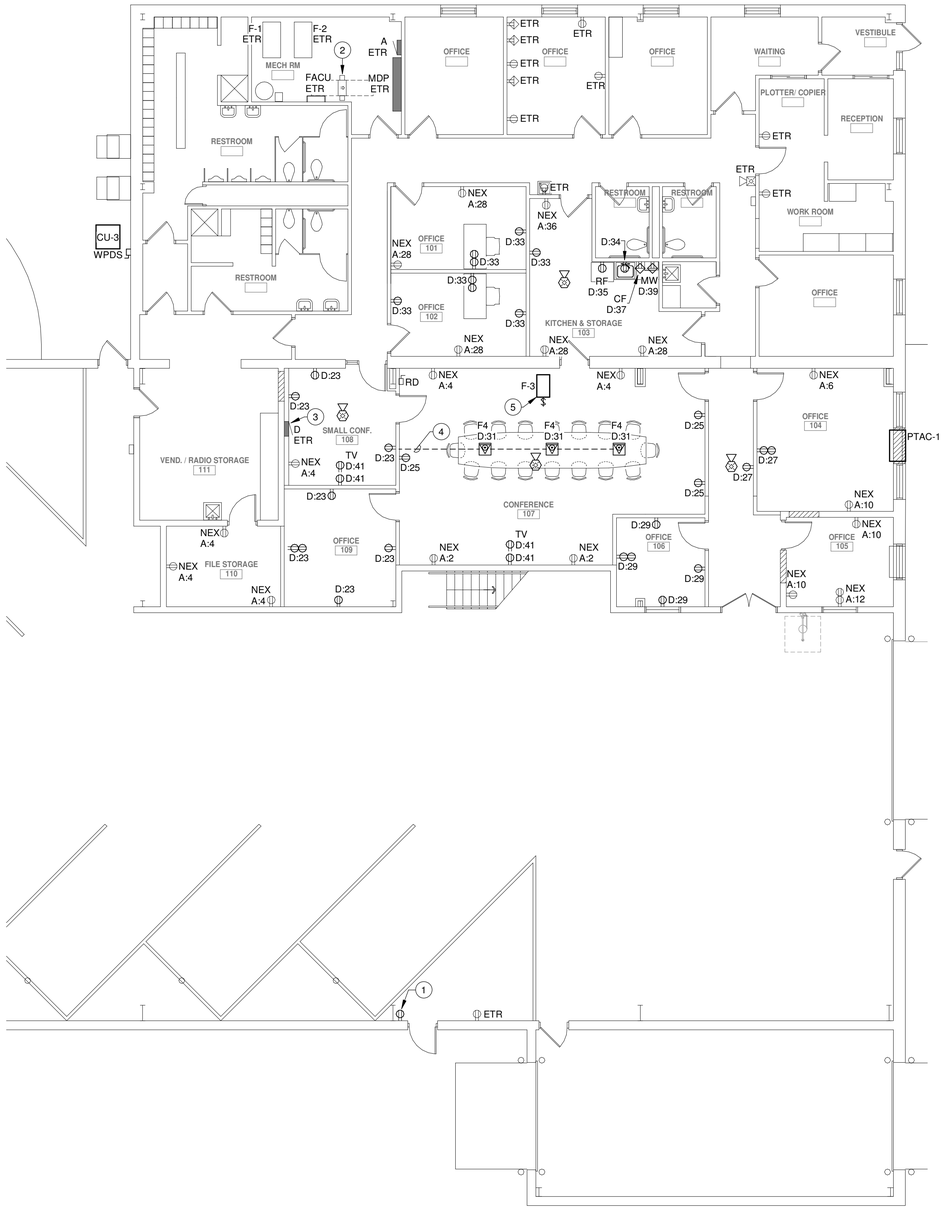


GENERAL NOTES:

A. ELECTRICAL DEVICES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN, ETR.

(X) PLAN NOTES

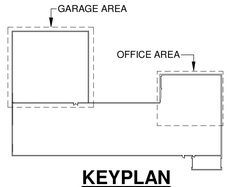
1 EC SHALL EXTEND BRANCH CIRCUIT OF REMOVED DEVICE TO NEW LOCATION. PROVIDE NEW BACKBOX AND DEVICE. ROUTE CONDUIT AROUND NEW DOORWAY.

2 LOCATION OF EXISTING TECHNOLOGY RACK.

3 EC SHALL REMOVE FRONT COVER OF EXISTING SURFACE MOUNTED PANELBOARD. WALL TO BE BUILTOUT AROUND PANEL BY OTHERS AND EC SHALL PROVIDE NEW RECESSED COVER FOR PANEL ONCE NEW WALL IS COMPLETE.

4 ROUTE FLOORBOX BRANCH CIRCUIT CONDUIT BELOW FLOOR TO WALL AS SHOWN AND INTO CEILING SPACE FOR CONTINUATION TO PANELBOARD.

5 EQUIPMENT LOCATED ON MEZZANINE LEVEL.



KEYPLAN
SCALE: NONE

SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

REVISIONS:

Karpinski ENGINEERING
13714 Cleveland Ave. NW
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600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
BRIAN J. DAVID
E-61663
REGISTERED PROFESSIONAL ENGINEER
©

THIS DWG :
OFFICE AREA POWER AND FIRE ALARM PLAN

ISSUED FOR BID

COMM 17186
DATE 02-24-2022

DWG
E-2.2

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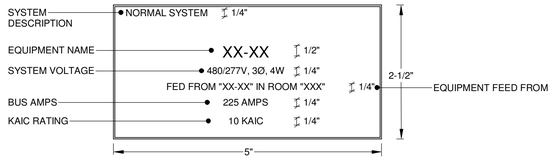
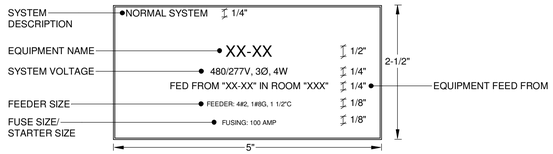


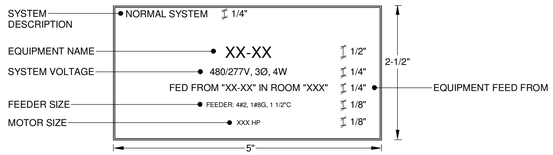
THIS NAMEPLATE SHALL BE USED FOR THE FOLLOWING:
- LIGHTING/APPLIANCE PANELBOARDS
- DISTRIBUTION PANELBOARDS
- FIRE ALARM PANELS/PULLBOXES/JUNCTION BOXES
- BAS PANELS

EQUIPMENT NAMEPLATE
SCALE: NONE



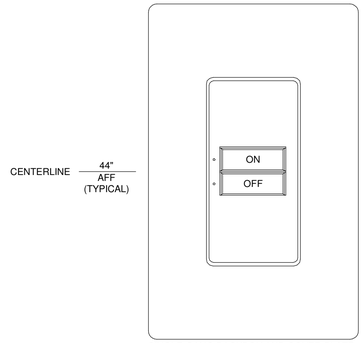
THIS NAMEPLATE SHALL BE USED FOR THE FOLLOWING:
- NON-FUSED DISCONNECTS
- FUSED DISCONNECTS
- MOTOR STARTERS
- COMBINATION STARTERS/DISCONNECTS
- VARIABLE FREQUENCY DRIVES

EQUIPMENT NAMEPLATE
SCALE: NONE



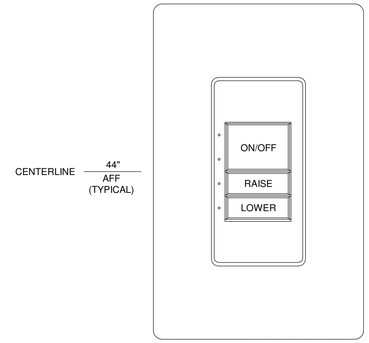
THIS NAMEPLATE SHALL BE USED FOR THE FOLLOWING:
- MOTORS

EQUIPMENT NAMEPLATE
SCALE: NONE



SINGLE-GANG BACKBOX AND COVER PLATE

TYPICAL LOW VOLTAGE CONTROL STATION DETAIL "L"
SCALE: NONE

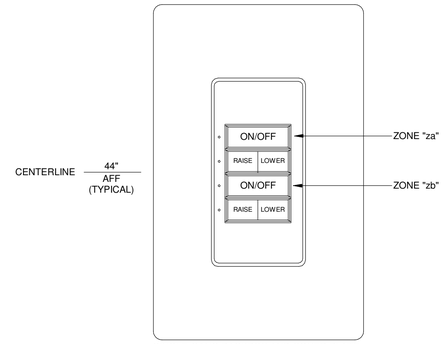


SINGLE-GANG BACKBOX AND COVER PLATE

TYPICAL LOW VOLTAGE CONTROL STATION DETAIL "LD"
SCALE: NONE

LOW VOLTAGE CONTROL STATION GENERAL NOTES:
A. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
B. PROVIDE ENGRAVED BUTTONS.

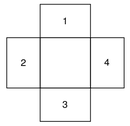
PROGRAMMING GENERAL NOTES:
A. SYSTEM SUPPLIER SHALL SUPERVISE INSTALLATION, PROGRAM AND TEST SYSTEM, AND INSTRUCT OWNER ON SYSTEM OPERATION. ALL PROGRAMMING SHALL BE APPROVED AND COORDINATED WITH OWNER.
B. ALL PROGRAMMING SHALL BE APPROVED AND COORDINATED WITH OWNER.



SINGLE-GANG BACKBOX AND COVER PLATE

TYPICAL LOW VOLTAGE CONTROL STATION DETAIL "LD2"
SCALE: NONE

FLOOR DEVICE SCHEDULE				
DESIGNATION TYPE	NUMBER OF COMPARTMENTS	DESCRIPTION	CATALOG NUMBER	NOTES
F4	4	COMBINATION FLUSH FLOOR POWER/VOICE/DATA SERVICE BOXES SHALL BE CAST-IRON, FLIP-TOP LID TYPE. EACH FLOOR BOX SHALL CONSIST OF TWO OR MORE SEPARATE WIRING COMPARTMENTS AT 120 CUBIC INCHES MINIMUM TOTAL VOLUME, CAST IRON WATERTIGHT CONSTRUCTION, FULLY ADJUSTABLE FOR ANY CONCRETE FLOOR POUR CONDITIONS.	WIREMOLD #EFB45S-OG HUBBELL #CFB4G30CI FSR #FL500 / FLGRD4	1



FLOOR BOX F4 COMPARTMENT SCHEDULE			
COMPARTMENT NUMBER	DEVICE TYPE	CONDUIT	NOTES
1	▼	(1) 1-1/4" CONDUIT	a, b, c
2	φ	(1) 3/4" CONDUIT	
3	φ		
4	φ		

FLOOR BOX F4 COMPARTMENT DIAGRAM
SCALE: NONE

FLOOR DEVICE GENERAL NOTES:
A. CARPET FLANGE COVERS SHALL BE PROVIDED IN ALL CARPETED AREAS. FLANGES, WHEN USED IN NON-CARPETED AREAS, SHALL BE TOTALLY FLUSH WITH THE FLOOR.

B. PROVIDE QUANTITY OF DUPLEX RECEPTACLE BRACKETS AND RJ VOICE/DATA BRACKETS AS INDICATED ON THE DRAWINGS. UNUSED GANGS SHALL BE PROVIDED WITH BLANK COVERPLATES.

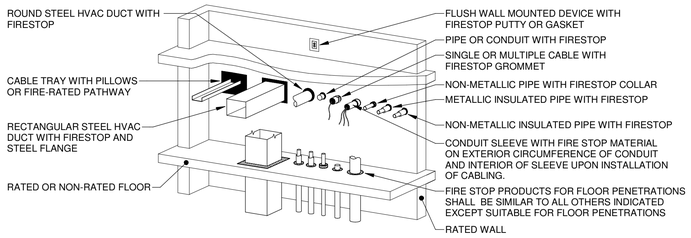
C. IF REQUIRED, PROVIDE SHEET METAL BARRIER IN WIRING COMPARTMENT TO SEPARATE LOW VOLTAGE WIRING FROM 120-VOLT BRANCH CIRCUITS.

FLOOR DEVICE SCHEDULE NOTES:
1. FOR FLOOR BOXES INSTALLED ON GRADE PROVIDE FLOOR BOX WITH EPOXY COATING OR PROVIDE POUR PAN AND VAPOR BARRIER. SUBMIT INSTALLATION DETAILS WITH FLOOR BOX SHOP DRAWINGS.

COMPARTMENT SCHEDULE NOTES:
a. PROVIDE CONDUIT UP TO THE NEAREST ACCESSIBLE CORRIDOR OR OPEN AREA CEILING SPACE.

b. REFER TO TECHNOLOGY DRAWINGS FOR FACEPLATE CONFIGURATIONS.

c. REFER TO TECHNOLOGY DRAWINGS FOR INTENDED CONDUIT ROUTING.



NOTES:
1. REFER TO UL FIRE RESISTANCE DIRECTORY FOR COMPLETE INSTALLATION REQUIREMENTS.
2. IN AN OCCUPIED BUILDING, PERMANENT FIRESTOPPING SHALL BE INSTALLED WITHIN 24 HOURS OF PENETRATING A FIRE-RATED ASSEMBLY. IF PERMANENT FIRESTOPPING CANNOT BE INSTALLED WITHIN THIS TIME PERIOD, TEMPORARY FIRESTOP PILLOWS/ BLOCKS ARE PERMITTED, WHERE INSTALLATION ALLOWS, UNTIL PERMANENT FIRESTOP MATERIALS CAN BE PROPERLY INSTALLED.

FIRESTOPPING DETAIL
SCALE: NONE

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THIS DWG :
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COMM 17186
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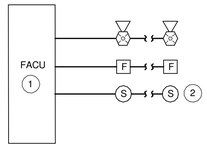


HARD-WIRED FIRE ALARM SYSTEM RISER

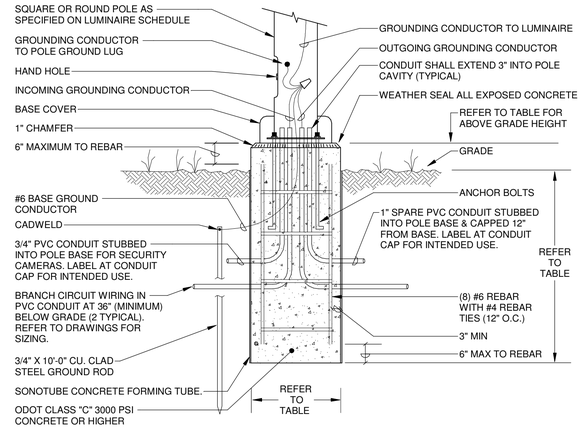
(TYPICAL DEVICES INDICATED) **SCALE: NONE**

FIRE ALARM SYSTEM GENERAL NOTES

1. THIS RISER REPRESENTS A TYPICAL SYSTEM AND IS NOT INTENDED FOR INSTALLATION. THE SYSTEM SUPPLIER SHALL PROVIDE INSTALLATION DRAWINGS AND WIRING DIAGRAMS. EXACT SYSTEM REQUIREMENTS SHALL BE COORDINATED WITH SYSTEM SUPPLIER.
2. SYSTEM SUPPLIER SHALL SUPERVISE INSTALLATION, TEST SYSTEM, AND INSTRUCT OWNER ON SYSTEM OPERATION.
3. ALL FIRE ALARM WIRING SHALL BE IN MINIMUM 3/4" CONDUIT. ALL WIRING SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR AND VERIFIED WITH THE SYSTEM SUPPLIER PRIOR TO BID. PROVIDE WIRING TO ALL DEVICES AS INDICATED AND AS RECOMMENDED BY THE SYSTEM SUPPLIER.
4. PROVIDE RELAYS FOR EACH SYSTEM FUNCTION LISTED AS RECOMMENDED BY THE SYSTEM SUPPLIER.
5. ALL CONTROL CABINETS SHALL BE GROUNDED PER SPECIFICATIONS AND NATIONAL ELECTRICAL CODE REQUIREMENTS.
6. COORDINATE CITY TIE-IN REQUIREMENTS WITH LOCAL AUTHORITY.
7. REFER TO SPECIFICATION FOR ADDITIONAL REQUIREMENTS. REFER TO FLOOR PLANS FOR DEVICE QUANTITIES AND LOCATIONS.
8. SUBMITTALS (CONSTRUCTION DOCUMENT SHOP DRAWINGS) SHALL INCLUDE A BOUND MANUAL WITH DATA SHEETS FOR ALL EQUIPMENT SPECIFIED AND INSTALLATION DRAWINGS INCLUDING SYSTEM WIRING DIAGRAMS.
9. CONSTRUCTION DOCUMENT SHOP DRAWING SUBMITTALS SHALL INDICATE EXACT CONDUIT AND WIRING REQUIREMENTS AND SHALL INCLUDE EQUIPMENT LOCATIONS SHOWN ON FLOOR PLANS (1/16" SCALE, MINIMUM). THE FOLLOWING ITEMS SHALL ALSO BE INCLUDED FOR PLAN REVIEW: BATTERY CALCULATIONS, VOLTAGE DROP CALCULATIONS, AND MANUFACTURER'S MODEL NUMBERS AND LISTING INFORMATION FOR EQUIPMENT, DEVICES AND MATERIALS.
10. THE FIRE ALARM SYSTEM SHALL BE PROVIDED BASED ON THE OBC BUILDING CLASSIFICATIONS AND THE REQUIREMENTS OF THE OBC, CHAPTER 9 - FIRE PROTECTION SYSTEMS. ANY SUSPECTED ERRORS OR OMISSIONS IN THE BID/DESIGN DRAWINGS AS DETERMINED BY THE SYSTEM SUPPLIER DURING BID REVIEW SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER. THE SYSTEM SUPPLIER'S BID COST SHALL INCLUDE ANY REQUIRED CHANGES IN THE DESIGN IN ORDER TO MEET CODE COMPLIANCE.
11. THE CONTRACTOR SHALL PROVIDE A COPY OF THE SUBMITTALS TO THE LOCAL AUTHORITY RESPONSIBLE FOR PERMIT APPROVAL.

(X) FIRE ALARM SYSTEM RISER NOTES:

1. FIRE ALARM CONTROL UNIT (FACU), TYPE TYCO PC4020 - ETR.
2. LOCATE 3 FEET FROM HVAC DIFFUSERS AND RETURN GRILLS.

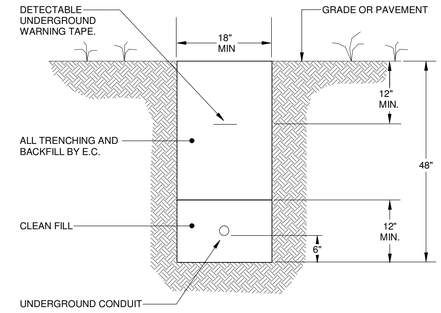


LUMINAIRE BASE DIMENSIONS					
LUMINAIRE TYPE	POLE HEIGHT	LOCATION	BASE DEPTH	BASE DIA	ABOVE GRADE HEIGHT
SLP3, SLP4	20'-0"	PARKING	48"	24"	30"

NOTES:
1. DETAIL ASSUMES 2000 PSF AVERAGE LATERAL SOIL BEARING CAPACITY IN UNDISTURBED (OR WELL COMPACTED) EARTH.
2. DESIGN ASSUMES SINGLE OR DOUBLE LUMINAIRE NOT EXCEEDING POLE MANUFACTURE'S SPECIFICATIONS FOR WEIGHT, MAXIMUM EPA (EFFECTIVE PROJECTED AREA), AND 100 MPH DESIGN WIND SPEED.
3. CONSULT STRUCTURAL ENGINEER IF ACTUAL SITE CONDITIONS (OR LUMINAIRE CONFIGURATION) VARIES FROM DESIGN ASSUMPTIONS.
4. USE GRADE 60 REINFORCING STEEL. USE EPOXY COATED STEEL IN PARKING LOT APPLICATIONS OR IN AREAS WHERE DE-ICING SALT IS USED. MAINTAIN 3" (MINIMUM).
5. INSTALL POLE IN STRICT ACCORDANCE WITH POLE MANUFACTURER'S RECOMMENDATIONS. VIBRATION DAMPENERS SHALL BE PROVIDED.
6. ANCHOR BOLTS SHALL NOT BE CUT OFF FOR ANY REASON. EXTENSION COUPLERS ARE NOT PERMITTED.
7. INSTALL FOUNDATION A MINIMUM OF 2'-6" FROM BACK OF CURB IN PARKING LOTS. INSTALL FOUNDATION A MINIMUM OF 36" FROM STORM OR SANITARY PIPING.
8. AT LOCATIONS WHERE THE EXISTING SLOPE IS 6:1 OR GREATER, THE BURIED DEPTH OF FOUNDATION SHALL APPLY TO THE LOW SIDE OF SLOPE.
9. PRECAST POLE BASES MEETING THE REQUIREMENTS OF DETAIL SHALL BE ACCEPTABLE.

POLE MOUNTED LUMINAIRE BASE DETAIL

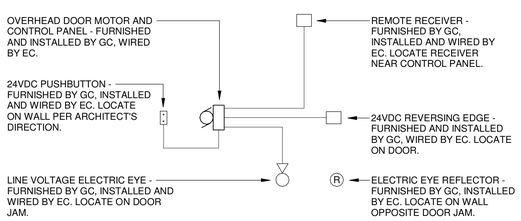
SCALE: NONE



NOTES:
1. CONTRACTOR SHALL LOCATE UNDERGROUND CONDUIT AT A MINIMUM OF 10'-0" FROM NEAREST TREE, OR IF NOT PRACTICAL, AS DIRECTED IN FIELD BY THE LANDSCAPE ARCHITECT.
2. ALL UNDERGROUND ELECTRICAL CONDUIT SHALL HAVE A DETECTABLE WARNING TAPE INSTALLED 12" BELOW GRADE - DIRECTLY ABOVE THE CONDUIT. WARNING TAPE SHALL BE "TERRA TAPE", 3" WIDE, LABELED WITH "CAUTION A, B, C, OR D BURIED BELOW". CONTACT: REEF INDUSTRIES, INC. 1-800-231-6074
   A. "ELECTRIC LINE", #42-0064
   B. "TELEPHONE LINE", #42-0041
   C. "HIGH VOLTAGE LINE", #42-0111
   D. "FIBER OPTIC CABLE", #42-0037
3. CONCRETE ENCASE CONDUIT(S) UNDER ROADWAYS, DRIVEWAYS AND PARKING LOTS. MINIMUM OF 3" CONCRETE ENCASEMENT. (NOT APPLICABLE FOR BRANCH CIRCUITS.)

UNDERGROUND CONDUIT INSTALLATION DETAIL

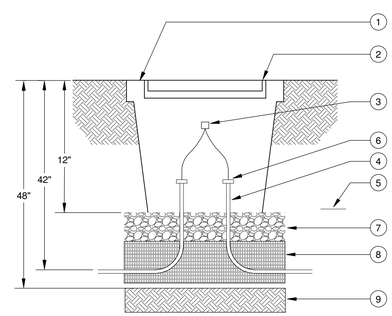
SCALE: NONE



NOTES:
1. WIRING DIAGRAM FOR BIDDING PURPOSES ONLY. EXACT WIRING REQUIREMENTS SHALL BE VERIFIED WITH THE SYSTEM SUPPLIER.
2. VERIFY LOCATION OF ALL DEVICES AND EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.

OVERHEAD DOOR MOTOR CONTROL WIRING DIAGRAM

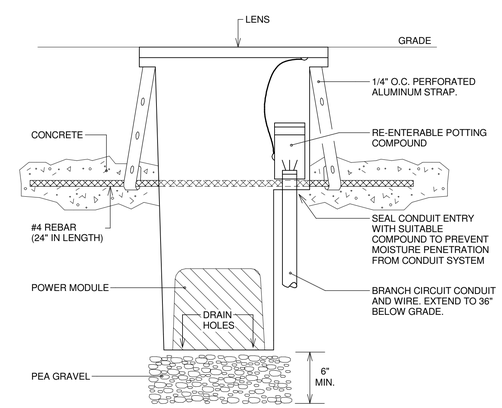
SCALE: NONE



NOTES:
1. FLUSH TO GRADE IN GROUND PULLBOX OPEN BOTTOM. QUAZITE SERIES PG OR EQUAL.
2. HEAVY DUTY BOLTED COVER WITH LOGO "ELECTRIC" AS APPLICABLE.
3. SPLICING CONNECTOR (BLACKBURN WR9, BRUNDY YPC2A8U OR EQUAL) ENCAPSULATED WITH A RAYCHEM GEL ENCLOSURE PART # GHFC-1-90.
4. CONDUITS TO EXTEND 3" ABOVE GRAVEL TYPICAL.
5. RED 3" WIDE WARNING TAPE WITH ALUMINUM CORE ABOVE ALL UNDERGROUND CONDUITS.
6. SEAL CONDUITS WITH POLYWATER FST-250 OR EQUAL.
7. 6" OF GRAVEL OR CRUSHED ROCK FOR DRAINAGE PURPOSES. EXTEND GRAVEL 4" BEYOND EDGE OF BOX.
8. CLEAN FILL.
9. UNDISTURBED EARTH MATERIAL.

TYPICAL HANDHOLE DETAIL

SCALE: NONE



IN-GRADE LUMINAIRE INSTALLATION DETAIL

SCALE: NONE

DETAIL NOTES:

THIS DETAIL REPRESENTS A TYPICAL FIXTURE IN SOIL WITH CONCRETE ANCHOR. EXACT INSTALLATION REQUIREMENTS SHALL BE COORDINATED WITH LUMINAIRE SUPPLIER.

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THIS DWG :
ELECTRICAL DETAILS AND DIAGRAMS

COMM 17186
DATE 02-24-2022

ISSUED FOR BID

DWG
E-6.2

Lighting and Appliance Panelboard: D

Location:
Supply From:
Mounting: RECESSED

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Bus Rating: 100 A
MCB Rating:

GENERAL NOTES: EXISTING PANEL TO REMAIN: CUTLER HAMMER PRL1a PANELBOARD

Notes	CKT	Circuit Description	Trip Amps	Poles	A		B		C		Poles	Trip Amps	Circuit Description	CKT	Notes
	1				0.0	--								2	
	3	MCB	100	3			0.0	--			3	--	UNUSABLE SPACE	4	
	5								0.0	--				6	
	7	EXISTING LOAD	20	2	1.0	1.0					2	20	EXISTING LOAD	8	
	9						1.0	1.0						10	
	11	EXISTING LOAD	20	2					1.0	1.0	2	20	EXISTING LOAD	12	
	13				1.0	1.0								14	
	15	EXISTING LOAD	20	2			1.0	1.0			2	20	EXISTING LOAD	16	
	17								1.0	1.0				18	
	19	EXISTING LOAD	20	2	1.0	1.0					2	20	EXISTING LOAD	20	
	21						1.0	1.0						22	
1	23	REC 108/109	20	1					1.6	0.5	1	20	EXISTING LOAD	24	
1	25	REC CONFERENCE 107	20	1	0.6	0.5					1	20	EXISTING LOAD	26	
1	27	REC OFFICE 104	20	1			0.4	0.5			1	20	EXISTING LOAD	28	
1	29	REC COMPUTER 106/109	20	1					1.0	0.5	1	20	EXISTING LOAD	30	
1	31	REC FB CONFERENCE 107	20	1	1.1	1.2					1	20	F-3	32	1
1	33	REC OFFICE 101/102	20	1			1.6	1.0			1	20	SINK DISPOSAL	34	2
2	35	FRIDGE 103	20	1					1.0	--	1	--	Space	36	
1	37	COFFEE 103	20	1	1.2	--					1	--	Space	38	
1	39	MICROWAVE 103	20	1			1.6	--			1	--	Space	40	
1	41	TV CONFERENCE ROOMS	20	1					1.2	--	1	--	Space	42	
				Total Load:	10.6 kW		11.1 kW		9.8 kW						
				Total Amp:	89 A		93 A		82 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	1177 VA	100.00%	1177 VA		
MISC	4600 VA	70.00%	3220 VA	**Total Conn. Load:**	31.5 kW
REC	25680 VA	69.47%	17840 VA	**Total Est. Demand:**	22.2 kW
				Total Conn.:	87 A
				Total Est. Demand:	62 A

Panel Schedule Notes:
1. EC SHALL PROVIDE NEW CIRCUIT BREAKER IN EXISTING SPACE.
2. EC SHALL PROVIDE NEW GFCI TYPE CIRCUIT BREAKER IN EXISTING SPACE.

Lighting and Appliance Panelboard: G

Location:
Supply From: MDP
Mounting: RECESSED

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MLO
Bus Rating: 225 A
MCB Rating: 225 A

GENERAL NOTES:

Notes	CKT	Circuit Description	Trip Amps	Poles	A		B		C		Poles	Trip Amps	Circuit Description	CKT	Notes
	1	LTG STOCK ROOM 113	20	1	0.6	1.5					2	20	EUH-1-1	2	
	3	LTG GARAGE	20	1			0.9	1.5						4	
	5	LTG DOORS	20	1					0.7	0.8	2	20	PTAC-1	6	
	7	GUH-2&3	20	1	1.1	0.8								8	
	9	REC EX WEST GARAGE DOORS	20	1			0.6	1.4			2	20	EF-12	10	
	11	REC EX EAST GARAGE DOORS	20	1					0.8	1.4				12	
	13	REC OFFICE 115	20	1	0.8	0.6					2	20	EF-13	14	
	15	REC STORAGE 114	20	1			1.0	0.6						16	
	17	REC S STOCK ROOM 113	20	1					0.6	0.8	2	20	EF-14	18	
	19	REC W STOCK ROOM 113	20	1	0.6	0.8								20	
	21	REC N STOCK ROOM 113	20	1			0.6	0.6			1	20	GRH-1, 2 & 3	22	
	23	REC SE GARAGE 116	20	1					0.6	0.4	1	20	GRH-4 & 5	24	
	25	REC SW GARAGE 116	20	1	0.6	1.2					1	20	OH NW GARAGE	26	
	27	REC NW GARAGE	20	1			0.6	1.2			1	20	OH SW GARAGE	28	
	29	REC N GARAGE 116	20	1					0.6	1.2	1	20	OH NE GARAGE	30	
	31	REC GARAGE 116	20	1	0.4	1.2					1	20	OH SE GARAGE	32	
	33	TP-EP-1	20	1			0.2	1.2			1	20	OH STOCK ROOM 113	34	
	35	DWH-1	20	1					0.2	0.5	1	20	GMCP-1	36	
	37	Spare	20	1	0.0	0.0					1	20	Spare	38	
	39	Spare	20	1			0.0	0.0			1	20	Spare	40	
	41	Spare	20	1					0.0	0.0	1	20	Spare	42	
	43	Spare	20	1	0.0	0.0					1	20	Spare	44	
	45	Spare	20	1			0.0	0.0			1	20	Spare	46	
	47	Spare	20	1					0.0	0.0	1	20	Spare	48	
	49	Spare	20	1	0.0	0.0					1	20	Spare	50	
	51	Spare	20	1			0.0	0.0			1	20	Spare	52	
	53	Spare	20	1					0.0	0.0	1	20	Spare	54	
				Total Load:	10.0 kW		10.4 kW		8.5 kW						
				Total Amp:	85 A		88 A		71 A						

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	7460 VA	100.00%	7460 VA		
LTG	2124 VA	100.00%	2124 VA	**Total Conn. Load:**	28.9 kW
MISC	6000 VA	70.00%	4200 VA	**Total Est. Demand:**	27.1 kW
Other	5474 VA	100.00%	5474 VA	**Total Conn.:**	80 A
REC	7800 VA	100.00%	7800 VA	**Total Est. Demand:**	75 A

Panel Schedule Notes:

REVISIONS:

Karpinski ENGINEERING
13714 Cleveland Ave. NW
Uniontown, OH 44685
330-699-4077
karpinskieng.com

600 MARKET AVENUE NORTH CANTON OHIO 44702

MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
BRIAN J. DAVID
E-61663
REGISTERED
PROFESSIONAL ENGINEER

THIS DWG :
ELECTRICAL PANEL SCHEDULES

COMM 17186
DATE 02-24-2022

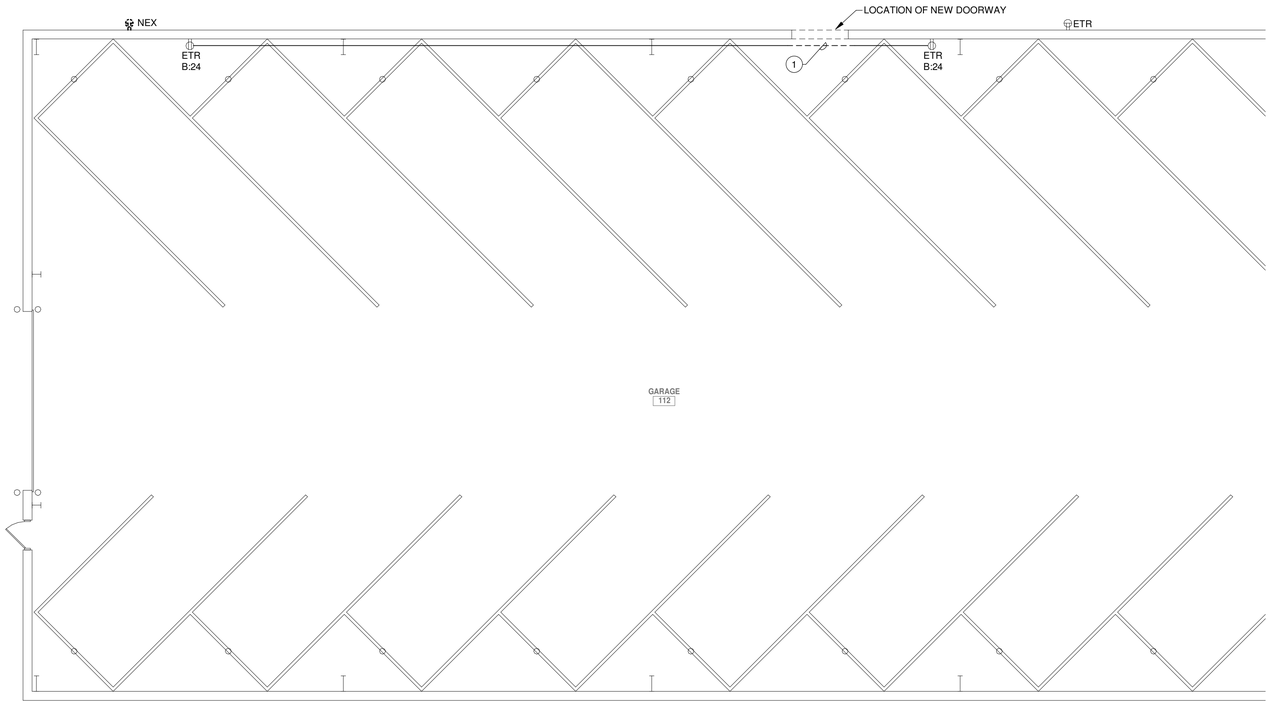
DWG
E-8.1

ISSUED FOR BID

REVISIONS:

GENERAL NOTES:

A. ELECTRICAL DEVICES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN, ETR.

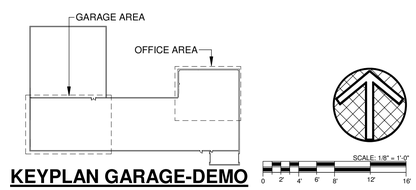


(X) PLAN NOTES

1 EXISTING CONDUIT BETWEEN RECEPTACLES IS SURFACE MOUNTED AT 48" AFF: EC SHALL MODIFY EXISTING ROUTING OF CONDUIT TO ALLOW FOR INSTALLATION OF NEW DOOR IN LOCATION SHOWN. EXTEND BRANCH CIRCUIT WIRING AS REQUIRED.

DEMOLITION NOTE

ALL LUMINAIRES, ELECTRICAL DEVICES AND EQUIPMENT SHOWN DASHED SHALL BE REMOVED (REX), UNLESS OTHERWISE NOTED.



KEYPLAN GARAGE-DEMO

SCALE: NONE

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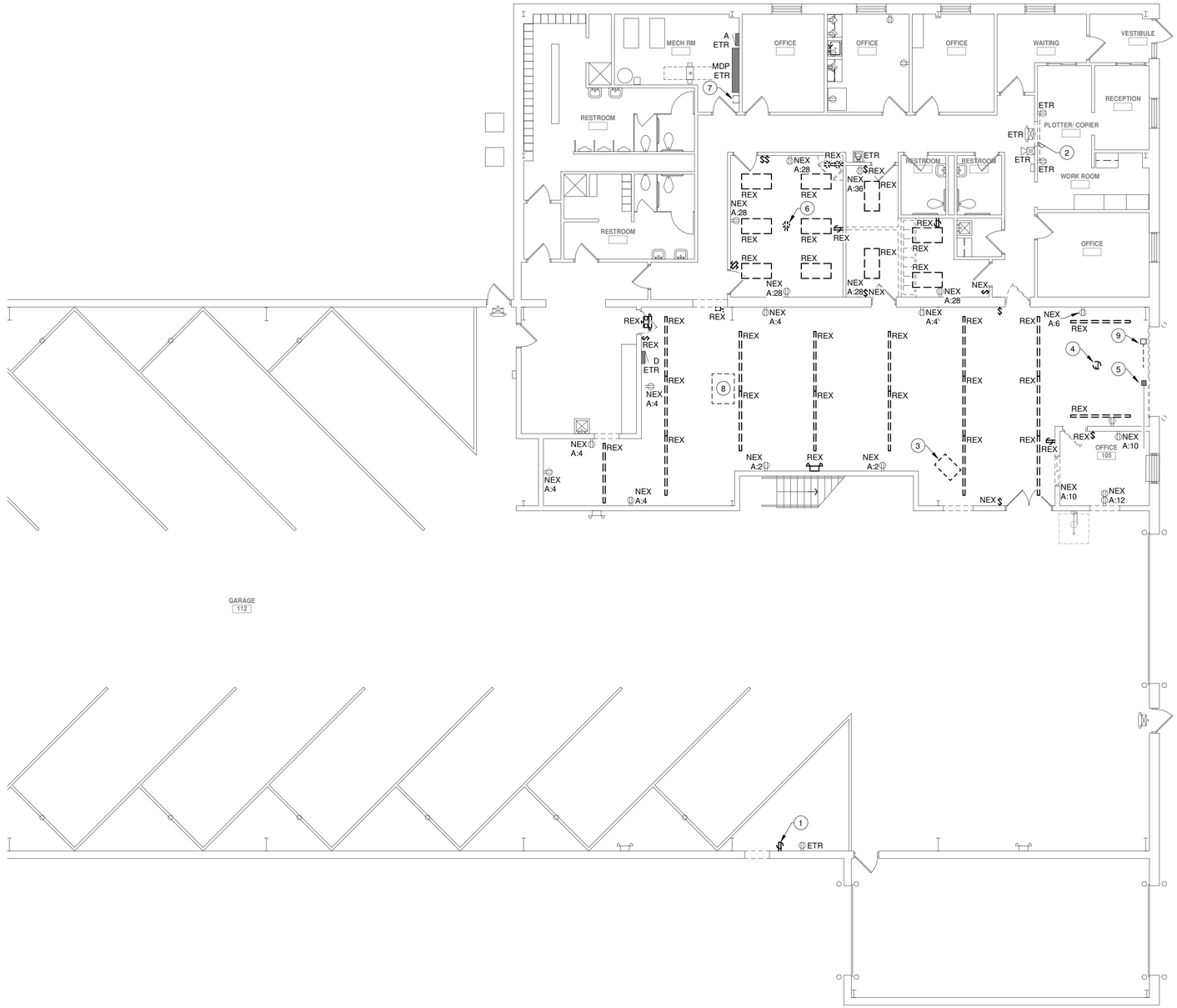
THIS DWG :
GARAGE ELECTRICAL DEMOLITION PLAN

ISSUED FOR BID

COMM 17186
DATE 02-24-2022

DWG
ED-1.1

REVISIONS:



GENERAL NOTES:

A. ELECTRICAL DEVICES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN, ETR.

(X) PLAN NOTES

1 EXISTING RECEPTACLE TO BE REMOVED AND RELOCATED TO ALLOW FOR INSTALLATION OF NEW DOOR.

2 EC SHALL MAINTAIN CONTINUITY OF RECEPTACLE BRANCH CIRCUITS DURING DEMOLITION OF WALL AND INSTALLATION ON NEW DOOR. EXTEND BRANCH CIRCUIT AS REQUIRED.

3 GAS UNIT HEATER TO BE REMOVED, REX.

4 EC SHALL DISCONNECT GARAGE DOOR OPENER AND COMPONENTS FOR REMOVAL. SYSTEM COMPONENTS SHALL BE TURNED OVER TO OWNER.

5 EXISTING MOTOR OPERATED DAMPER TO REMAIN.

6 CEILING MOUNTED RECEPTACLE TO BE REMOVED, REX.

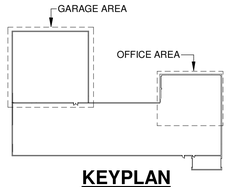
7 EXISTING LIGHTING CONTACTOR "C-3" TO BE REMOVED. EC SHALL MAINTAIN PATHWAYS TO EXISTING EXTERIOR FIXTURES FOR CONNECTION TO NEW LIGHTING RELAY PANEL, UON.

8 INLINE FAN EXHAUST FAN LOCATED ON MEXXANINE LEVEL TO BE REMOVED, REX.

9 EXISTING MOTOR OPERATED DAMPER TO BE REMOVED, REX. COORDINATE WITH MC.

DEMOLITION NOTE

ALL LUMINAIRES, ELECTRICAL DEVICES AND EQUIPMENT SHOWN DASHED SHALL BE REMOVED (REX), UNLESS OTHERWISE NOTED.



KEYPLAN

SCALE: NONE

SCALE: 1/8" = 1'-0"

0 2' 4' 6' 8' 12' 16'

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MOTTER & MEADOWS ARCHITECTS

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THIS DWG :

OFFICE AREA ELECTRICAL DEMOLITION PLAN

ISSUED FOR BID

COMM 17186

DATE 02-24-2022

DWG

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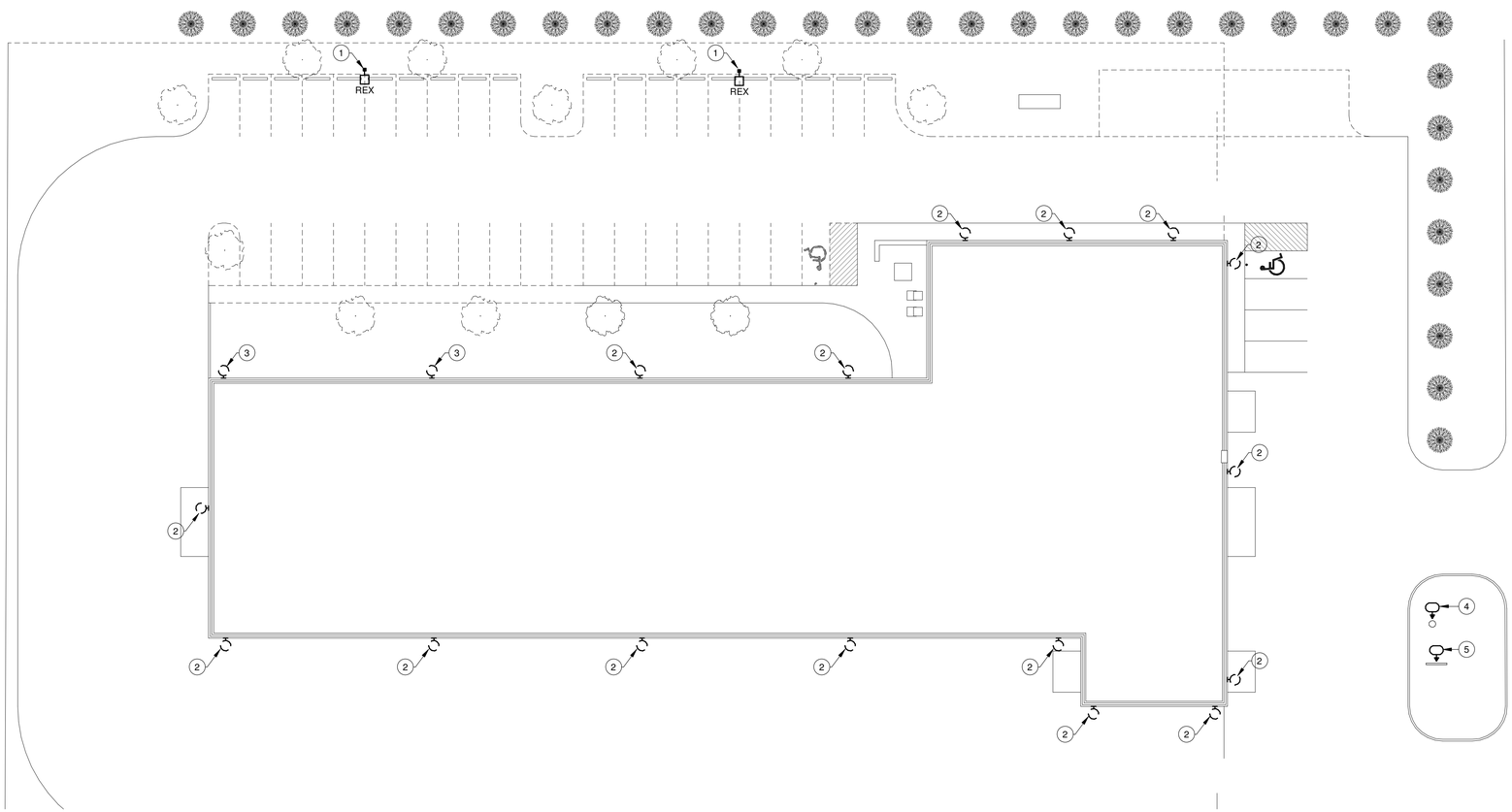

(X) PLAN NOTES

1. EXISTING LIGHT POLE TO BE REMOVED. EC SHALL REMOVE EXISTING LIGHTING BRANCH CIRCUIT BACK TO ELECTRICAL ROOM. NEW BRANCH CIRCUIT TO BE PROVIDED TO NEW LIGHT POLE FIXTURES DURING NEW WORK.
2. EC SHALL REMOVE EXISTING FIXTURE. MAINTAIN EXISTING CONDUIT AND CONDUCTORS FOR CONNECTION OF NEW FIXTURE IN LOCATION DURING NEW WORK.
3. EXISTING WALL-MOUNTED LUMINAIRE TO BE REMOVED. EC SHALL MAINTAIN THE CONTINUITY OF THE CIRCUIT INTERRUPTED BY REMOVAL OF FIXTURES. BACKBOX MAY REMAIN. PROVIDE NEW BLANK COVERPLATE.
4. EXISTING FLAG POLE FIXTURE LOCATION: EC SHALL REMOVE EXISTING FIXTURE. MAINTAIN EXISTING LIGHTING BRANCH CIRCUIT AND CONTROLS AT FLAG POLE LOCATION FOR EXTENSION TO NEW FIXTURES DURING NEW WORK.
5. EXISTING BUILDING SIGN LIGHTING: EC SHALL REMOVE EXISITNG LIGHT FIXTURE AND MAINTAIN EXISTING LIGHTING BRANCH CIRCUIT AT SIGN LOCATION FOR EXTENSION TO NEW FIXTURE DURING NEW WORK. MAINTAIN EXISTING CONTROLS.

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MOTTER & MEADOWS ARCHITECTS

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BRIAN J. DAVID
E-61663
REGISTERED PROFESSIONAL ENGINEER
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DEMOLITION NOTE

ALL LUMINAIRES, ELECTRICAL DEVICES AND EQUIPMENT SHOWN DASHED SHALL BE REMOVED (REX), UNLESS OTHERWISE NOTED.

SCALE: 1" = 20'-0"
0 20' 40'

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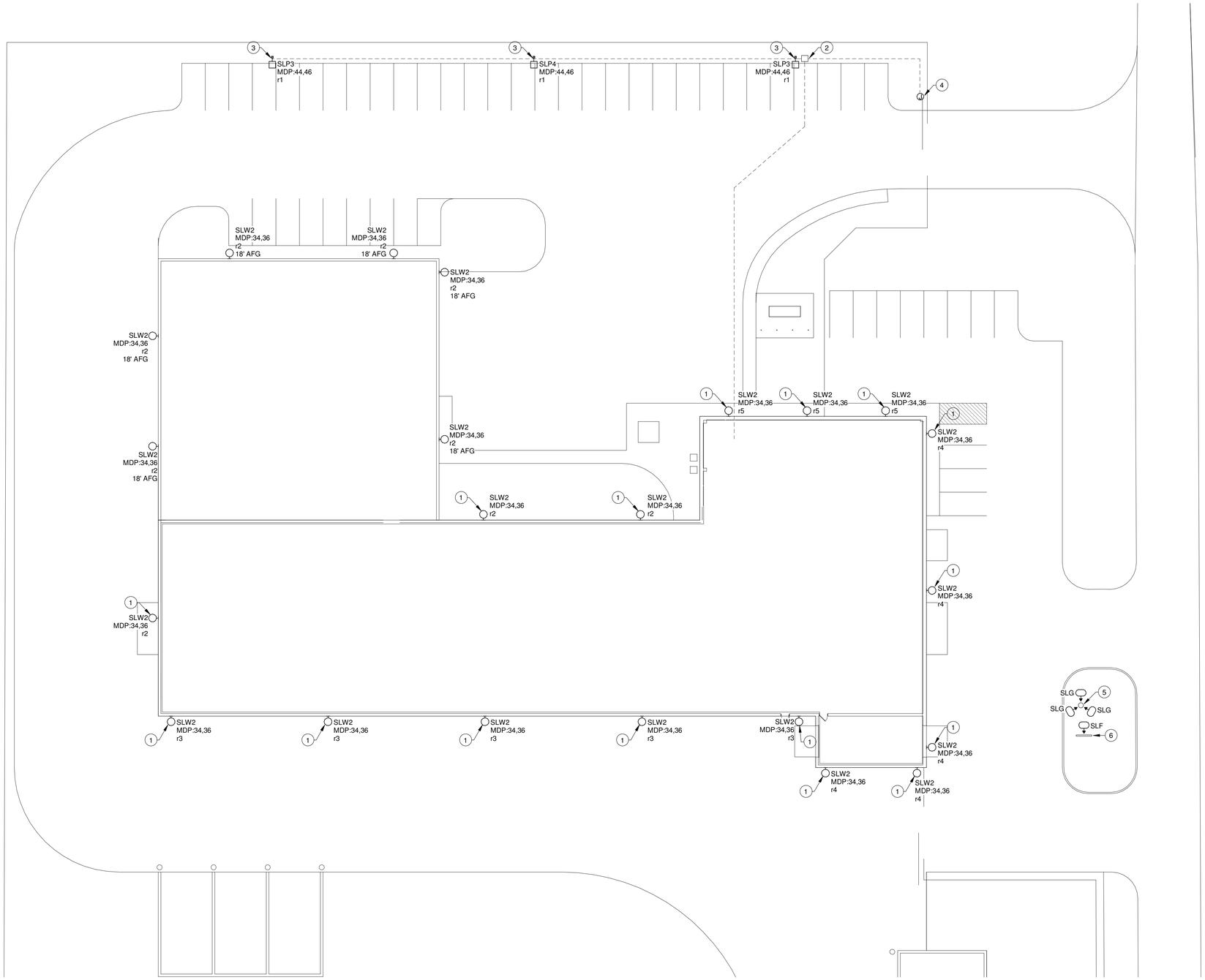
THIS DWG :
SITE ELECTRICAL DEMOLITION PLAN

COMM 17186
DATE 02-24-2022

DWG
ES-1.0

REVISIONS:



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PLAN NOTES

1. EC TO PROVIDE LUMINAIRE IN LOCATION OF REMOVED FIXTURE. MAINTAIN EXISTING CONDUCTORS AND CONDUITS FROM ELEC/MECH ROOM.
2. PROVIDE ELECTRICAL HANDHOLE: PROVIDE (2) 1" CONDUITS (ONE SPARE) BACK TO THE MAIN ELECTRICAL ROOM.
3. EC SHALL UTILIZE EXISTING BRANCH CIRCUIT OF REMOVED LIGHT POLES AND ROUTE TO LOCATION OF NEW FIXTURES. EC SHALL ROUTE THROUGH LIGHTING RELAY PANEL "LRP".
4. ELECTRIC GATE OPERATOR, 1/2 HP, 120V: PROVIDE NEW BRANCH CIRCUIT UTILIZING EXISTING SPARE 20A/1P CIRCUIT BREAKER IN MDP. PROVIDE 2#12, #12G. PROVIDE 3/4" CONDUIT FROM ELECTRIC HAND HOLE TO GATE OPERATOR LOCATION. COORDINATE LOCATION WITH ARCHITECT.
5. EXISTING FLAG POLE LOCATION: EC SHALL REUSE EXISTING LIGHTING BRANCH CIRCUIT AT FLAG POLE LOCATION AND EXTEND TO LOCATIONS OF FIXTURES SHOWN.
6. EXISTING BUILDING SIGN: EC SHALL REUSE EXISTING LIGHTING BRANCH CIRCUIT AT SIGN LOCATION AND EXTEND TO LOCATION OF FIXTURE SHOWN.

SCALE: 1" = 20'-0"
0 20' 40'

MOTTER & MEADOWS ARCHITECTS

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THIS DWG :
SITE ELECTRICAL PLAN

COMM 17186
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DRAWING LIST - TECHNOLOGY	
NUMBER	NAME
T-0.1	TECHNOLOGY SYMBOL LEGEND AND GENERAL NOTES
T-1.1	GARAGE TECHNOLOGY PLAN
T-1.2	OFFICE AREA TECHNOLOGY PLAN
T-6.1	TECHNOLOGY DETAILS AND DIAGRAMS
TD-1.2	OFFICE AREA TECHNOLOGY DEMOLITION PLAN

GENERAL TECHNOLOGY NOTES:

A. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS, OR SHAFTS SHALL BE SEALED IN ACCORDANCE WITH TECHNOLOGY FIRESTOPPING SPECIFICATION SECTION.

B. CONTRACTOR SHALL COORDINATE LOCATIONS OF ALL CEILING MOUNTED DEVICES WITH THE ARCHITECTURAL REFLECTED CEILING PLANS, ELEVATIONS, SECTIONS, AND DETAILS. CONTRACTOR SHALL ALSO COORDINATE LOCATIONS OF WORK AREA OUTLETS AND OTHER WALL MOUNTED DEVICES WITH THE ARCHITECTURAL WALL ELEVATIONS AND FINISHES.

C. THE ROUTING OF ALL SURFACE MOUNTED/EXPOSED CONDUIT OR RACEWAY IN FINISHED AREAS (OR WHERE NOTED ON THE DRAWINGS) SHALL BE COORDINATED WITH, AND SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

D. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR AND ELECTRICAL EQUIPMENT WITH THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL MAKE APPROPRIATE ADJUSTMENTS TO CONDUIT AND RACEWAY LOCATIONS AS REQUIRED. FOR ADDITIONAL REQUIREMENTS, REFER TO TECHNOLOGY PATHWAY HARDWARE SPECIFICATION SECTION.

E. ALL CABLE TRAYS SHALL BE INSTALLED SO AS TO BE U.L. LISTED AS BEING ELECTRICALLY CONTINUOUS FOR GROUNDING PURPOSES, AND SHALL BE BONDED TO AN ACCEPTABLE TELECOMMUNICATIONS GROUND ONLY.

F. ALL PULLBOXES AND JUNCTION BOXES SHALL BE INSTALLED IN A "READILY ACCESSIBLE" LOCATION AND SHALL HAVE PROPER WORKING SPACE AS DEFINED IN NEC ARTICLE 100 AND 110.

G. UTILIZATION OF THE PHRASE "PROVIDED BY" WITHIN THE CONTEXT OF THESE DOCUMENTS SHALL EXPLICITLY REPRESENT "FURNISHED AND INSTALLED BY".

H. TC SHALL PROVIDE (2) CAT6A UTP CABLE FOR EACH ACCESS POINT AND TERMINATE IN PATCH PANEL IN THE CORRESPONDING TELECOMMUNICATIONS ROOM. AT EACH ACCESS POINT, TC SHALL TERMINATE (RJ-45 JACKS IN SURFACE MOUNT OUTLET BOX), COIL AND LEAVE 20' OF SLACK ABOVE CEILING. TC SHALL SUPPORT COILED UTP WITH J-HOOK. TC SHALL INCLUDE COSTS TO RELOCATE ACCESS POINTS, UP TO 20', ONCE THE WIRELESS SURVEY IS COMPLETED BY THE OWNER'S VENDOR.

TECHNOLOGY ABBREVIATIONS

SYMBOL	DESCRIPTION
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
BAS	BUILDING AUTOMATION SYSTEM
BBC	BONDING BACKBONE CONDUCTOR
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
CATV	COMMUNITY ANTENNA TELEVISION (CABLE TELEVISION)
DAS	DISTRIBUTED ANTENNA SYSTEM
EC	ELECTRICAL CONTRACTOR
EIC	ELECTRONICS INDUSTRIES ASSOCIATION
EMT	ELECTRICAL METALLIC TUBING
ETR	EXISTING TECHNOLOGY DEVICE TO REMAIN
GC	GENERAL CONTRACTOR
GEC	GROUNDING ELECTRODE CONDUCTOR
HC	HORIZONTAL CROSS-CONNECT
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
IC	INTERMEDIATE CROSS-CONNECT
MC	MAIN CROSS-CONNECT
MM	MULTIMODE
MUTOA	MULTI-USER TELECOMMUNICATIONS OUTLET ASSEMBLY
NEC	NATIONAL ELECTRICAL CODE
NEX	REMOVE EXISTING TECHNOLOGY DEVICE AND INSTALL NEW TECHNOLOGY DEVICE IN EXISTING OUTLET BOX. REFER TO NEW FLOOR PLANS FOR NEW DEVICE TYPE AND CABLING REQUIREMENTS. PROVIDE NEW FACEPLATE.
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
OBC	OHIO BUILDING CODE
PBB	PRIMARY BONDING BUSSBAR FOR TELECOMMUNICATIONS
POE	POWER OVER ETHERNET
PSRE	PUBLIC SAFETY RADIO ENHANCEMENT
PTZ	PAN, TILT, ZOOM
RCDD	REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
RD	NEW LOCATION OF RELOCATED TECHNOLOGY DEVICE
REX	REMOVE EXISTING TECHNOLOGY DEVICE ALONG WITH RELATED CONDUIT AND CABLING, UON
RR	REMOVE AND RELOCATE EXISTING TECHNOLOGY DEVICE AS SHOWN OR AS NOTED ON DRAWINGS
SM	SINGLE MODE
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TC	TECHNOLOGY CONTRACTOR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TYP	TYPICAL
UPS	UNINTERRUPTIBLE POWER SUPPLY
UON	UNLESS OTHERWISE NOTED
WAP	WIRELESS ACCESS POINT
8P8C	EIGHT PIN - EIGHT CONDUCTOR

PATHWAY AND EQUIPMENT SYMBOL LEGEND

SYMBOL	DESCRIPTION
	CONDUIT TURNED DOWN
	CONDUIT TURNED UP
	CONDUIT INSTALLED BELOW GRADE OR BELOW FINISHED FLOOR
#X#	CABLE TRAY OF SIZE "#X#" - REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
	LADDER TYPE CABLE TRAY - REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
	SURFACE RACEWAY - REFER TO DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION
	COMBINATION IN FLOOR POWER / DATA / A/V DEVICE. FLOOR BOX, CONDUIT, POWER DEVICE AND RELATED POWER WIRING PROVIDED BY EC. REFER TO FLOORBOX AND POKE THROUGH SCHEDULE AND DETAILS FOR ADDITIONAL INFORMATION. 'FX' = FLOORBOX DEVICE "X" 'PX' = POKE THROUGH DEVICE "X"
	CROSS CONNECT
	VERTICAL SERVICE POLE
	PROTECTION FOR CLASS II CABLING. REFER TO TECHNOLOGY PATHWAY HARDWARE SPECIFICATION FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
	GROUNDING BUSBAR
	19" TECHNOLOGY EQUIPMENT OPEN RACK, DUAL UPRIGHT WITH VERTICAL MANAGEMENT, UON.

COMMUNICATION SYMBOL LEGEND

SYMBOL	DESCRIPTION
R	ROUGH-IN OUTLET BOX - REFER TO ROUGH-IN DIAGRAM FOR ADDITIONAL INFORMATION

COMMUNICATION SCHEDULE

LABEL	DESCRIPTION
H	REFER TO NAMEPLATE DETAIL FOR DEVICE INFORMATION.
L	REFER TO NAMEPLATE DETAIL FOR DEVICE INFORMATION.

SECURITY SYMBOL LEGEND

SYMBOL	DESCRIPTION
	SECURITY SYSTEM DOOR CONTACTS - MOUNTED AS INDICATED ON DRAWINGS
S	WALL MOUNTED SYSTEM SECURITY DEVICE - MOUNTED AS INDICATED ON DRAWINGS
S	CEILING MOUNTED SECURITY SYSTEM DEVICE

SECURITY SCHEDULE

LABEL	DESCRIPTION
M	SECURITY SYSTEM MOTION SENSOR
OH	OVERHEAD DOOR CONTACT

DATA DEVICE SYMBOL LEGEND

SYMBOL	DESCRIPTION
	GENERIC VOICE/DATA DEVICE AND OUTLET BOX INDICATED FOR DEMOLITION - REFER TO DRAWINGS FOR ADDITIONAL INFORMATION
	WORK AREA DEVICE, UON. REFER TO FACEPLATE DETAILS FOR ADDITIONAL INFORMATION
	CEILING MOUNTED WIRELESS DEVICE - WIRELESS ACCESS POINT, UON

WIRELESS DEVICE SCHEDULE

LABEL	DESCRIPTION
A	REFER TO NAMEPLATE DETAIL FOR DEVICE INFORMATION.
B	REFER TO NAMEPLATE DETAIL FOR DEVICE INFORMATION.

GENERAL TECHNOLOGY NOTES:

A. ALL CONDUIT PENETRATIONS THROUGH FIRE RATED WALLS, FLOORS, OR SHAFTS SHALL BE SEALED IN ACCORDANCE WITH TECHNOLOGY FIRESTOPPING SPECIFICATION SECTION.

B. CONTRACTOR SHALL COORDINATE LOCATIONS OF ALL CEILING MOUNTED DEVICES WITH THE ARCHITECTURAL REFLECTED CEILING PLANS, ELEVATIONS, SECTIONS, AND DETAILS. CONTRACTOR SHALL ALSO COORDINATE LOCATIONS OF WORK AREA OUTLETS AND OTHER WALL MOUNTED DEVICES WITH THE ARCHITECTURAL WALL ELEVATIONS AND FINISHES.

C. THE ROUTING OF ALL SURFACE MOUNTED/EXPOSED CONDUIT OR RACEWAY IN FINISHED AREAS (OR WHERE NOTED ON THE DRAWINGS) SHALL BE COORDINATED WITH, AND SHALL BE APPROVED BY THE ARCHITECT PRIOR TO INSTALLATION.

D. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR AND ELECTRICAL EQUIPMENT WITH THE ELECTRICAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL MAKE APPROPRIATE ADJUSTMENTS TO CONDUIT AND RACEWAY LOCATIONS AS REQUIRED. FOR ADDITIONAL REQUIREMENTS, REFER TO TECHNOLOGY PATHWAY HARDWARE SPECIFICATION SECTION.

E. ALL CABLE TRAYS SHALL BE INSTALLED SO AS TO BE U.L. LISTED AS BEING ELECTRICALLY CONTINUOUS FOR GROUNDING PURPOSES, AND SHALL BE BONDED TO AN ACCEPTABLE TELECOMMUNICATIONS GROUND ONLY.

F. ALL PULLBOXES AND JUNCTION BOXES SHALL BE INSTALLED IN A "READILY ACCESSIBLE" LOCATION AND SHALL HAVE PROPER WORKING SPACE AS DEFINED IN NEC ARTICLE 100 AND 110.

G. UTILIZATION OF THE PHRASE "PROVIDED BY" WITHIN THE CONTEXT OF THESE DOCUMENTS SHALL EXPLICITLY REPRESENT "FURNISHED AND INSTALLED BY".

H. TC SHALL PROVIDE (2) CAT6A UTP CABLE FOR EACH ACCESS POINT AND TERMINATE IN PATCH PANEL IN THE CORRESPONDING TELECOMMUNICATIONS ROOM. AT EACH ACCESS POINT, TC SHALL TERMINATE (RJ-45 JACKS IN SURFACE MOUNT OUTLET BOX), COIL AND LEAVE 20' OF SLACK ABOVE CEILING. TC SHALL SUPPORT COILED UTP WITH J-HOOK. TC SHALL INCLUDE COSTS TO RELOCATE ACCESS POINTS, UP TO 20', ONCE THE WIRELESS SURVEY IS COMPLETED BY THE OWNER'S VENDOR.

ELECTRICAL AND TECHNOLOGY DIVISION OF SCOPE

WORK SCOPE			ELECTRICAL CONTRACTOR		TECHNOLOGY CONTRACTOR		OWNER'S SYSTEM SUPPLIER		OWNER
SYSTEM	SPECIFIED IN DIVISION	BIDDING NOTE	FURNISH SYSTEM EQUIPMENT, WIRING, AND INSTALLATION	FURNISH AND INSTALL ROUGH-IN	FURNISH SYSTEM EQUIPMENT, WIRING, AND INSTALLATION	EQUIPMENT INSTALLATION AND WIRING	FURNISH SYSTEM EQUIPMENT, WIRING, AND INSTALLATION	EQUIPMENT INSTALLATION AND WIRING	FURNISH SYSTEM EQUIPMENT
VOICE/DATA	27			X	X				X
AUDIO VISUAL	27			X	X				X
PAGING	27			X	X				X
SECURITY / CCTV	27			X	X				X

BIDDING NOTES:

1. SEPARATE ELECTRICAL AND TECHNOLOGY CONTRACTORS MAY BID WORK SCOPE AS DELINEATED BY THE DIVISION 26 AND DIVISION 27 CONTRACT DOCUMENTS. REFER TO SPECIFICATION 26 01 00 FOR ADDITIONAL CLARIFICATION OF DIVISION 26 AND 27 BIDDING REQUIREMENTS.
2. CONTRACTORS SHALL EXAMINE ALL DIVISION 26 AND 27 DRAWINGS AND SPECIFICATIONS AS IT PERTAINS TO THEIR SCOPE OF WORK AND SHALL INCLUDE ALL RELATED COSTS IN BIDS.
3. ROUGH-IN INCLUDES ALL CONTINUOUS PATHWAYS (INCLUDING BUT NOT LIMITED TO CONDUITS, CABLE TRAYS, CONDUIT SLEEVES AND CONTINUOUS RACEWAYS) AND ASSOCIATED BACK BOXES, JUNCTION BOXES, FLOOR DEVICES, AND RELATED HARDWARE REQUIRED FOR ALL LOW VOLTAGE CABLING ROUGH-INS AND EQUIPMENT INSTALLATIONS, UNLESS OTHERWISE NOTED BELOW.
4. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING DIVISION 26 REQUIREMENTS:
   A. PROVISION OF ALL LINE VOLTAGE DEVICES, EQUIPMENT, WIRING, AND TERMINATIONS.
   B. PROVISION OF CONDUIT SLEEVES INTO ALL SPACES CONTAINING DISTRIBUTION OF LOW VOLTAGE SERVICES, UNLESS OTHERWISE NOTED BELOW. ALL CONDUIT SLEEVES SHALL BE A MINIMUM OF 2" PER TECHNOLOGY SYSTEM.
   C. COORDINATION OF EXACT SIZE AND QUANTITY OF CONDUITS PRIOR TO ROUGH-IN. CONDUIT FILL SHALL NOT EXCEED 40%.
   D. FIRESTOPPING AROUND CONDUIT AND CONDUIT SLEEVE PENETRATIONS.
5. THE [TECHNOLOGY] [ELECTRICAL] CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING DIVISION 27 REQUIREMENTS:
   A. PROVISION OF ALL OTHER CABLING, CONNECTORS, NON-CONTINUOUS PATHWAY HARDWARE, FACEPLATES, LABELS, AND ALL OTHER RELATED MATERIALS AND LABOR REQUIRED TO PROVIDE COMPLETE AND FUNCTIONAL LOW VOLTAGE SYSTEMS.
   B. SEALING INNER/CONDUIT PENETRATIONS UPON COMPLETION OF LOW VOLTAGE CABLING INSTALLATION WITH APPROVED FIRESTOP AND/OR APPROVED SEALANT PRODUCT.
6. THE OWNER SHALL BE RESPONSIBLE FOR:
   A. PROVISION OF THE FOLLOWING VOICE / DATA EQUIPMENT: ALL ACTIVE NETWORK AND TELEPHONE EQUIPMENT.
   B. PROVISION OF THE FOLLOWING AUDIO VISUAL EQUIPMENT: VIDEO DISPLAY EQUIPMENT.
   C. PROVISION OF THE FOLLOWING SECURITY EQUIPMENT: EXISTING HEAD-END HARDWARE.

REVISIONS:

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COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
BRIAN J. DAVID
E-61663
REGISTERED PROFESSIONAL ENGINEER

THIS DWG :
TECHNOLOGY SYMBOL LEGEND AND GENERAL NOTES

COMM 17186
DATE 02-24-2022

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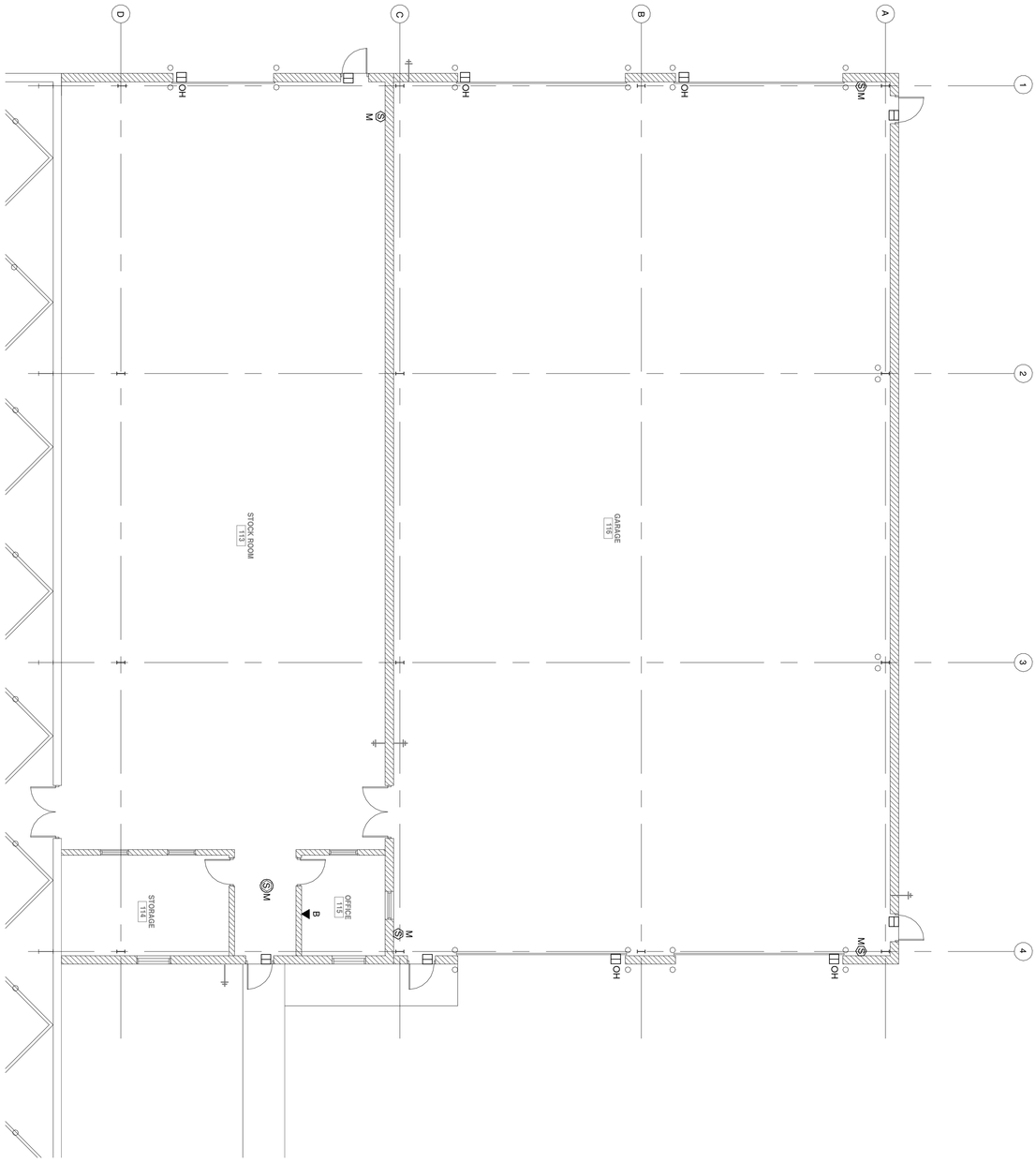

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MOTTER & MEADOWS
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STATE OF OHIO
BRIAN D. DAVID
E-61665
Registered
PROFESSIONAL ENGINEER

THIS DWG :
GARAGE TECHNOLOGY PLAN

COMM 17186
DATE 02-24-2022

DWG
T-1.1

ISSUED FOR BID

SCALE: 1/8" = 1'-0"

REVISIONS:

GENERAL NOTES:

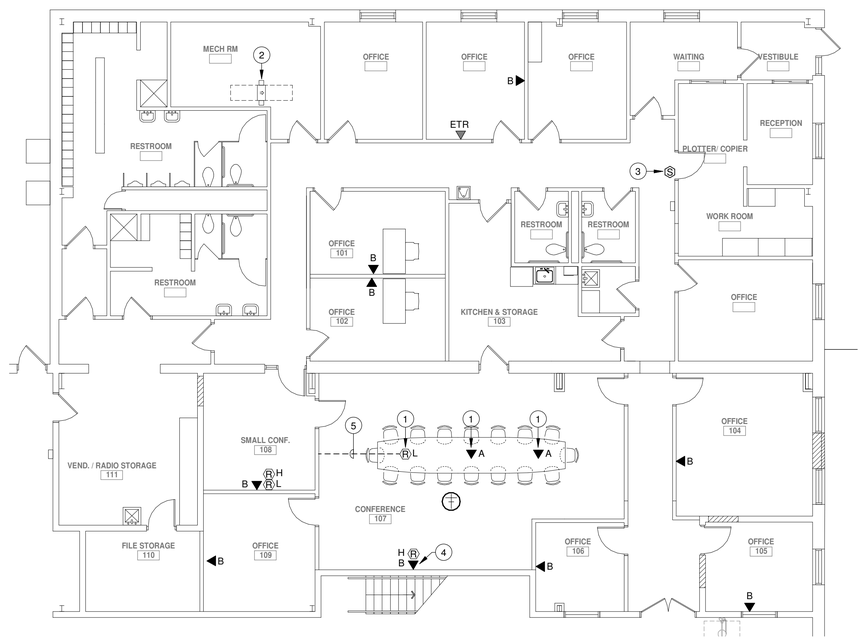
A. ELECTRICAL DEVICES NOT SHOWN ON DRAWING ARE EXISTING TO REMAIN, ETR.

Karpinski ENGINEERING
13714 Cleveland Ave. NW
Uniontown, OH 44685
330-699-4077
karpinskieng.com

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
James J Gremba
BICSI ID # 107714
EXPIRES 12-31-23
RCDD

(X) PLAN NOTES

1. PROVIDE DEVICE IN TYPE 'F4' FLOORBOX. REFER TO ELECTRICAL DRAWINGS FOR MORE INFORMATION.
2. LOCATION OF EXISTING TECHNOLOGY RACK.
3. LOCATION OF EXISTING SECURITY OCCUPANCY SENSOR: REMOVE DEVICE PRIOR TO DEMOLITION OF WALL. INSTALL DEVICE IN NEW LOCATION ABOVE NEW DOOR. PROVIDE NEW WIRING AS REQUIRED.
4. NEW DEVICES INDICATED IN THIS LOCATION SHALL UTILIZE NEW SURFACE MOUNTED RACEWAYS AND BACKBOXES, ROUTED DOWN FROM ACCESSIBLE CEILING SPACE.
5. WIRING ASSOCIATED WITH DEVICES LOCATED IN FLOOR BOXES SHALL BE ROUTED BELOW FINISHED FLOOR TO NEAREST WALL CAVITY AND UP TO ACCESSIBLE CEILING SPACE.



SCALE: 1/8" = 1'-0"
0 2' 4' 6' 8' 12' 16'

MOTTER & MEADOWS ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
BRIAN J. DAVID
E-61663
REGISTERED PROFESSIONAL ENGINEER
©

THIS DWG :
OFFICE AREA TECHNOLOGY PLAN

ISSUED FOR BID

COMM 17186
DATE 02-24-2022

DWG
T-1.2

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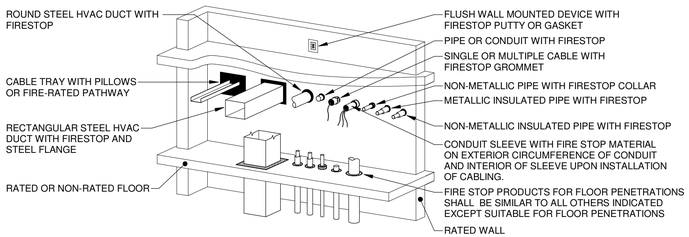


NOTES:
1. REFER TO UL FIRE RESISTANCE DIRECTORY FOR COMPLETE INSTALLATION REQUIREMENTS.
2. IN AN OCCUPIED BUILDING, PERMANENT FIRESTOPPING SHALL BE INSTALLED WITHIN 24 HOURS OF PENETRATING A FIRE-RATED ASSEMBLY. IF PERMANENT FIRESTOPPING CANNOT BE INSTALLED WITHIN THIS TIME PERIOD, TEMPORARY FIRESTOP PILLOWS/ BLOCKS ARE PERMITTED, WHERE INSTALLATION ALLOWS, UNTIL PERMANENT FIRESTOP MATERIALS CAN BE PROPERLY INSTALLED.

FIRESTOPPING DETAIL

SCALE: NONE

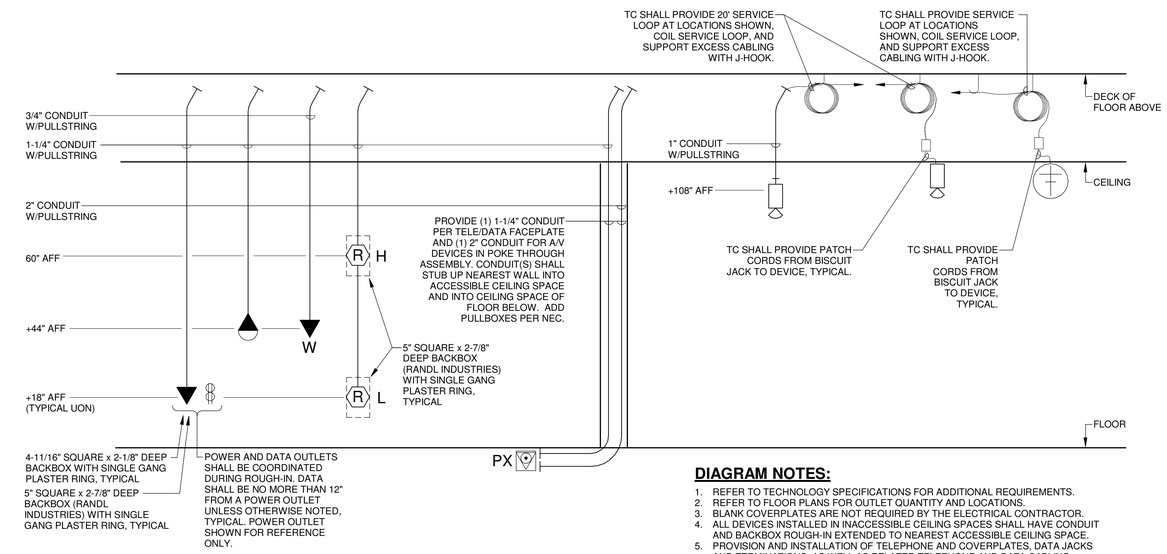
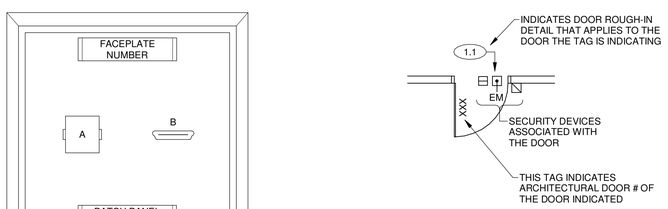


DIAGRAM NOTES:

1. REFER TO TECHNOLOGY SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. REFER TO FLOOR PLANS FOR OUTLET QUANTITY AND LOCATIONS.
3. BLANK COVERPLATES ARE NOT REQUIRED BY THE ELECTRICAL CONTRACTOR.
4. ALL DEVICES INSTALLED IN INACCESSIBLE CEILING SPACES SHALL HAVE CONDUIT AND BACKBOX ROUGH-IN EXTENDED TO NEAREST ACCESSIBLE CEILING SPACE.
5. PROVISION AND INSTALLATION OF TELEPHONE AND COVERPLATES, DATA JACKS AND TERMINATIONS, AS WELL AS RELATED TELEPHONE AND DATA CABLING (PLENUM APPROVED AS REQUIRED, UON), IS BY THE TECHNOLOGY CONTRACTOR.
6. PROVISION AND INSTALLATION OF TELEVISION CABLING (PLENUM APPROVED AS REQUIRED, UON) AND TERMINATIONS ARE BY THE TECHNOLOGY CONTRACTOR.
7. EC SHALL COORDINATE DEVICE LOCATIONS AND ROUGH-IN REQUIREMENTS WITH ARCHITECT AND OWNER PRIOR TO ROUGH-IN. EC SHALL PROVIDE PULLBOXES PER NEC.
8. TC SHALL PROVIDE J-HOOK SUPPORT EVERY 5' ON CENTER FOR ALL CABLING WHICH WILL SPAN 5' OR MORE WITHOUT OTHER APPROVED CABLE SUPPORT MECHANISM, UON.
9. PRIOR TO ROUGH-IN OF WALL PHONE PROPER SIDE CLEARANCES SHALL BE VERIFIED. WALLPHONE OUTLETS SHALL HAVE AT LEAST 12" OF CLEAR SPACE ON ALL SIDES.

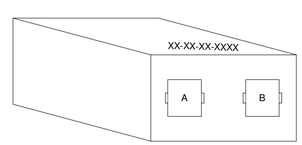
TYPICAL TECHNOLOGY ROUGH-IN DIARAM

SCALE: NONE



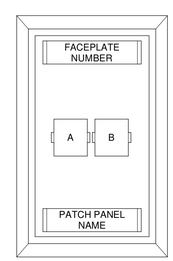
TYPE "ST" SPEAKER TERMINAL FACEPLATE DETAIL					
POSITION	JACK TYPE	JACK COLOR	TYPE	CABLE TYPE	CABLE COLOR
A	CAT-6A 8P8C	BLUE	DATA	CAT-6A	BLUE
B	HDMI	IVORY	VIDEO	HDMI	BLACK
C	CAT-6A 8P8C	BLUE	DATA	CAT-6A	BLUE
D	HDMI	IVORY	VIDEO	HDMI	BLACK

SCALE : NONE



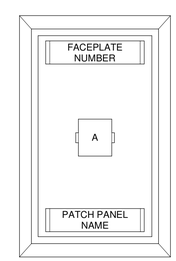
TYPE "WAP" FACEPLATE DETAIL					
POSITION	JACK TYPE	JACK COLOR	TYPE	CABLE TYPE	CABLE COLOR
A	CAT-6 8P8C	BLUE	DATA	CAT-6	BLUE
B	CAT-6 8P8C	BLUE	DATA	CAT-6	BLUE

SCALE : NONE



TYPE "B" FACEPLATE DETAIL					
POSITION	JACK TYPE	JACK COLOR	TYPE	CABLE TYPE	CABLE COLOR
A	CAT-6 8P8C	WHITE	VOICE	CAT-6	BLUE
B	CAT-6 8P8C	BLUE	DATA	CAT-6	BLUE

SCALE : NONE



TYPE "A" FACEPLATE DETAIL					
POSITION	JACK TYPE	JACK COLOR	TYPE	CABLE TYPE	CABLE COLOR
A	CAT-6 8P8C	BLUE	DATA	CAT-6	BLUE

SCALE : NONE

REVISIONS:

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REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
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MOTTER & MEADOWS ARCHITECTS

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

STATE OF OHIO
BRIAN J. DAVID
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REGISTERED PROFESSIONAL ENGINEER
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THIS DWG :
TECHNOLOGY DETAILS AND DIAGRAMS

COMM 17186
DATE 02-24-2022

DWG
T-6.1

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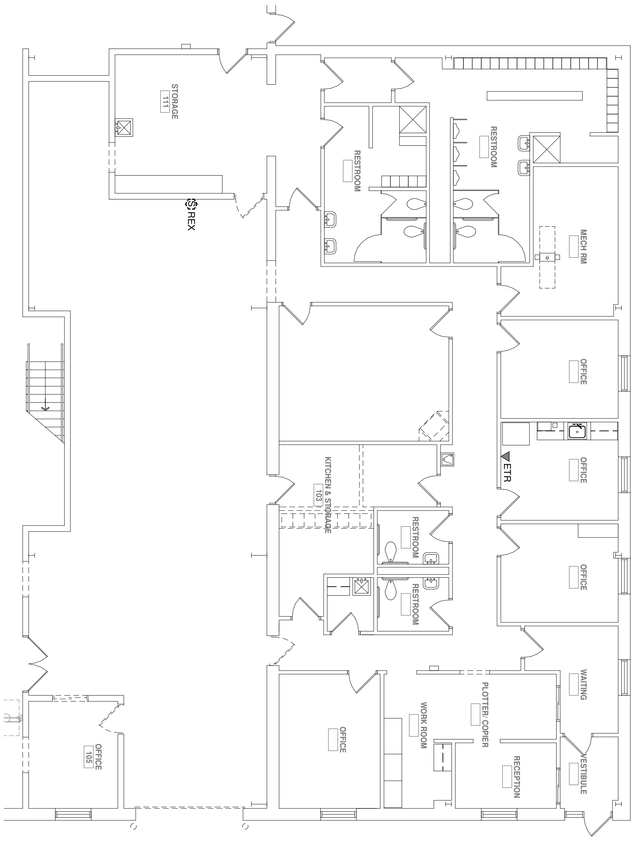

SCALE: 1/8" = 1'-0"

ISSUED FOR BID

DWG	COMM	17186
TD-1.2	DATE	02-24-2022

THIS DWG :
OFFICE AREA TECHNOLOGY
DEMOLITION PLAN

STATE OF OHIO
BRIAN D. DAVID
E-61663
Registered
PROFESSIONAL ENGINEER

MOTTER & MEADOWS
ARCHITECTS

600 MARKET AVENUE NORTH CANTON OHIO 44702

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
James J. Cerneka
BICSI ID # 10774
Expires 15-31-23
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REVISIONS:

CITY OF CANTON
COLLECTION SYSTEMS SERVICE CENTER AND ADMINISTRATION BUILDING
REGENT AVENUE N.E.

SPECIFICATION MANUAL INDEX

DIVISION 1

ARCHITECTURAL / STRUCTURAL DIVISIONS 2 THRU 10

SPECIFICATION MANUAL INDEX

FIRE PROTECTION DIVISION 21

PLUMBING DIVISION 22

TECHNOLOGY DIVISION 27

HVAC DIVISION 23

SPECIFICATION MANUAL INDEX

ELECTRICAL DIVISION 26

CIVIL DIVISIONS 31, 32, 33

SECTION 01 10 00 – SUMMARY OF WORK

A. GENERAL INTENT STATEMENT

1. The following scope of work is intended to be general in nature. The intention is to have the successful General Contractor perform all related work shown on the Contract Documents other than those items specifically indicated below to be excluded. The General Contractor and subcontractors shall be responsible for portions of work contained within Division 1 General Requirements as applicable to the scope of work for that respective package.

B. GENERAL DESCRIPTION

1. The Project consists of providing all material, labor, equipment, and supervision to complete all construction related services as detailed within project drawings and specifications.
2. The Owner is The City of Canton, 218 Cleveland Avenue SW, Canton, Ohio 44702.
3. The Architect is Motter & Meadows Architects, 600 Market Avenue North, Canton, Ohio 44702.
4. The Project will be administrated under a single General Contract arrangement direct with the Owner. All bids should be based upon LUMP SUM proposals, excluding all exempt taxes, unless specifically indicated otherwise.

C. CONTRACT REFERENCES

1. All drawings and specifications by Motter & Meadows Architects dated February 24, 2022, Legal Notice, Bid Form, Addenda, Instructions to Bidders, Owner-Contractor Agreement, and General Conditions of the Contract.
2. All Division 1 – Requirements
3. All bids must conform with the requirements of the Instructions to Bidders.
4. A Bid Guaranty and Contract Bond is required from all General Contract bidders.
5. In the event of failure to perform the Work in accordance with the requirements, the work of the General Contract is subject to liquidated damages in accordance with the Owner-Contractor Agreement, or other Contract as determined by the City.

D. PROJECT REQUIREMENTS

1. All items listed below are the absolute responsibility of the General Contractor as it relates to the complete scope of work.
   a. Review all drawings and all specifications, including those drawings and specifications not directly pertaining to his immediate scope of work, to ensure that the General Contractor has completely included all elements of the work in his bid. This will insure that the sum of all bids will provide a complete Project.
   b. Comply with all federal, state, local, and company safety regulations to insure a safe working environment for all workers.
   c. All labor rates used for bidding purposes shall include all taxes, fringes, etc. and shall be firm during the entire construction period.
   d. Limit use of the premises to work areas indicated. Confine operations to areas within contract limits indicated, unless the Work is specifically called out beyond those limits. Do not disturb portions of the site beyond the areas in which the Work is indicated. Restore any disturbed conditions to the satisfaction of the Architect.
   e. Keep existing streets, driveways, parking and entrances serving the premises clear at all times. Do not use these areas for parking or storage of materials.
   f. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated and or directed by the Architect/Owner. If additional storage is necessary, obtain and pay for such storage off site. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such

vehicles or equipment unattended with the motor running or the ignition key in place. Do not bring or store unnecessary vehicles on site.

g. In compliance with the Ohio Revised Code, the General Contractor and subcontractors shall give proper notice to affected Utilities indicating when and where excavation shall take place. This notice shall occur at least two working days, excluding Saturdays, Sundays and legal holidays, prior to commencing work. Each Contractor shall immediately alert occupants of nearby premises as to any emergency that may be created or discovered on or near the underground work. Any damage, break or leak on any utility line shall be immediately reported to the appropriate Utility.
h. Reviewing Specification Section 01 23 00 Alternates to incorporate information into bid. All alternates should be filled in on the bid form. If an alternate does not apply, or has no cost, a zero should be filled in on the bid form. Failure to make an entry or an entry of "No Bid," or "N/A," or similar entry for any Alternate may cause the Bidder to be rejected as non-responsible only if the Alternate is selected.
i. Complete and functional installation. This includes any permits and testing required by local or state building codes to complete the system.
j. Timely completion of the work, and coordination and timely submission of needed decisions, submittals, samples, mock-ups, coordination drawings, material deliveries, sufficient equipment and manpower so as not to delay any Project activity.
k. Coordination of site layout will accommodate requirements of trailers, materials or other necessary items that will also occupy the site. All movement of temporary items on site will occur only following consultation with and approval from the Architect/Owner.
l. Provide all layouts required for all work included within their respective sub-contract. The Contractor must verify existing conditions and make the necessary adjustments. The Contractor can utilize points established by others, however must verify and accept these control points.
m. Coordination of all inspection required by the City, County, State and Local authorities as mandated. In addition, this contractor shall secure and pay for all permits, governmental fees, licenses, and inspections necessary for proper execution of the Contract OR AS REQUIRED TO PERFORM WORK IN CITY OF CANTON, STARK COUNTY, OHIO.
n. Have a responsible supervisor onsite at all times when work is being performed.
o. Clean (and polish) all products installed under this contract for final project completion and inspection. Should this not be performed to the fullest extent, Owner will hire an outside source to perform this work and this cost will be billed to the General Contractor.
p. Coordination of all trades for proper sequencing and installation of material supplied under this Contract to ensure the Master Construction Schedule is not jeopardized.
q. Provide all as-builts, project record documents, and warranties as required per the Specifications no later than 2 weeks after work is complete.
r. Ensure 100% safety requirements relative to the performance of its work.
s. Dewatering any excavations required by its own work, and is to install pumps as required with sufficient hose to divert water to site drainage outlets. Generators necessary to power capacity is to be provided to prevent lost time due to flooding of the excavation. See Specification 01 51 00.
t. Provide daily clean up of construction debris and disposal of materials into on-site dumpsters. Any materials not cleaned-up during the day's operations will be performed later that evening, on an overtime bases by others, at this Contractor's expense. Advanced notice will not be given.
u. Provide and maintain all hoisting and OSHA approved scaffolds as necessary to install work.
v. Coordinate the need for testing and inspections with the Architect at least twenty-four (24) hours prior to covering of work.
w. Responsible for all materials required by the Work, to include but not limited to: providing, delivery, storage, handling, erection and protection of all materials within this scope of work. All major deliveries must be coordinated with the Architect/Owner to ensure allowable space for placement of materials.
x. Include re-mobilization costs and out-of sequence work, which may be required due to temporary facilities, access for long lead mechanical and electrical items, and/or scheduling constraints.

y. Dust control, traffic control and roadway cleaning. Each general trade contractor is responsible to clean streets of any debris or spillage of material as a result of and during the performance of their own work.
z. Removal of snow and ice as required for the performance of their own work.

END OF SECTION 01 10 00

SECTION 01210 - ALLOWANCES

A. SUMMARY
1. All allowances shall be Lump Sum Allowances.

B. RELATED DOCUMENTS
1. Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to work of this Section.

C. SUBMITTALS
1. Submit proposal for the purchase of products or system included in allowances as specified for Change Orders.
2. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

E. PROCEDURES
1. Amount of allowance includes:
   a. Net cost of product.
   b. Delivery to the site.
   c. Handling at the site including unloading, uncrating, maintenance and storage.
   d. Protection from elements, from damage.
   e. Labor, installation and finishing.
   f. Fuel costs.
   g. Other expenses (i.e. testing, adjusting, and balancing) required for complete installation.
   h. Overhead and profit is included in the Base Bid amount.
2. Use the allowance only as directed by the Architect. All labor requests will require time tickets signed by the Architect to process for payment.
3. Change orders authorizing use of funds from an allowance will include Contractor's related costs and overhead and profit margins as provided for under the General Conditions.
4. At the Project closeout, credit unused amounts remaining in allowances by the use of established unit prices. A change order will be prepared to adjust the Contract Sum accordingly.

F. LUMP SUM ALLOWANCES
1. General Contractor shall include in the Base Bid, the following allowance for work beyond the scope indicated in the Contract Documents. Use of Allowance to be authorized by Architect in writing. Unused portion to be credited to Owner.
   a. General Purpose Construction Allowance $ 40,000.00

G. ADJUSTMENT OF CASH ALLOWANCES
1. Unused amounts of monies included under allowances shall be credited to the Owner by deduct Change Order prior to approval of Final Application for Payment.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

A. SUMMARY

1. This Section includes administrative and procedural requirements for alternates.

B. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

C. DEFINITIONS

1. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   a. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

D. PROCEDURES

1. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
   a. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
2. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
3. Execute accepted alternates under the same conditions as other work of the Contract.
4. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

E. SCHEDULE OF ALTERNATES TO GENERAL CONTRACT

ALTERNATE NO. 1: Alternate Bid amount to remove existing gas line and replace with new gas line from meter to generator, due to possible conflict with subgrade elevation at new parking spaces.

SECTION 01 29 73 – SCHEDULE OF VALUES

A. SUMMARY

1. This Section specifies administrative and procedural requirements governing the General Contractor's Schedule of Values.
    1. Coordinate the Schedule of Values (Contract Cost Breakdown) with the Applications for Payment, Project Schedule, Submittal Schedule, and List of Subcontracts.
2. Progress payments will not be processed without an approved Schedule of Values on file.

B. SCHEDULE OF VALUES (CONTRACT COST BREAKDOWN)

1. Coordination: The General Contractor shall coordinate preparation of its Schedule of Values for its part of the Work with the Master Construction Schedule.
    a. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
        1. Master Construction Schedule.
        2. Application for Payment forms, including Continuation Sheets.
        3. List of subcontractors.
        4. Schedule of allowances.
        5. Schedule of alternates.
        6. List of products.
        7. List of principal suppliers and fabricators.
        8. Schedule of submittals.
    b. Within 10 days of award of Contract, each the General Contractor shall submit to the Architect a Schedule of Values, for approval, showing accurate costs for the items of work assigned to the Contractor, defined under Section 01 10 00 – Summary of the Work.
2. Format and Content: The Schedule of Values shall include at a minimum a line item for labor and material costs for each unit of Work, and shall further divide the work into a sufficient number of individual work items to serve as an accurate basis for Contractor's Application for Payment. Each work item shall receive its prorated share of profit and overhead, including a line item for closeout. The Schedule of Values shall consist of a complete breakdown of the Contractor's contract sum showing the various items of work, divided so as to facilitate the approval of payments to the Contractor for Work completed. Each item of Work shall have indicated a separate cost of labor and material. This schedule when reviewed by the Architect and Owner shall be used as the basis of approving payments along with establishing percentages of Work complete.
    a. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications of Payment and progress reports. Break principal subcontract amounts down into several line items.
    b. Arrange the Schedule of Values in tabular form with separate columns to indicate the following of each item listed.
        1. Related Specification Section or Division.
        2. Description of Work.
        3. Name of subcontractor.
        4. Name of manufacturer or fabricator.
        5. Name of supplier.
        6. Change Order (numbers) that affect value.
        7. Dollar value.
        8. Percentage of Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
    c. Round amounts of nearest whole dollar; the total shall equal the Contract Sum.

d. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed.
   1. Differentiate between items stored on-site and items stored off-site. Include requirements for insurance bonded warehousing, if required.
e. Provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of the part of the Work.
f. Unit-Cost Allowances: Show the line-item value of unit-cost allowances, as a product of the unit cost, multiplied by the measured quantity. Estimate quantities from the best indication in the Contract Documents.
g. Margins of Cost: Show line items for indirect costs and margins on actual costs only when such items are listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete. Include the total cost and proportionate share of general overhead and profit margin for each item.
   1. At the contractor's option, Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at the Contractor's option.
h. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

3. Should the Schedule of Values be "rejected, resubmit", resubmittal is due within 5 days of receipt of rejected schedule.

C. <u>CONTRACTORS CONTRACT COST BREAKDOWN / SCHEDULE OF VALUES</u>

1. Within 10 days after Notice to Proceed, the General Contractor's Contract Cost Breakdown shall be submitted to the Architect on the contractor's letterhead.
2. The Contract Cost Breakdown is to be presented in tabular format with four columns consisting of:
   a. Item description.
   b. Labor value.
   c. Material value.
   d. Total value.
3. The Contract Cost Breakdown must be approved by the Architect prior to receipt of any progress payments.

END OF SECTION 01 29 73

SECTION 01 29 76 – APPLICATIONS FOR PAYMENT & CHANGE ORDER

A. SUMMARY

1. This Section specifies administrative and procedural requirements governing the General Contractor's Applications for Payment.
   a. Coordinate the applications for Payment with the Schedule of Values, Project Schedule, Submittal Schedule, and List of Subcontracts.
2. Change Order Pricing

B. APPLICATION FOR PAYMENT PROCEDURES

1. Submit request for each calendar month, not later than 20th day of the month. Use form acceptable to the Architect/Engineer, fully completed and executed; including attachment of waivers and similar documentation.
2. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect/Engineer and paid for by the Owner.
3. Application Preparation: Complete every entry on the form. Include notarization and execution by a person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned, without action.
   a. Entries shall match data on the Schedule of Values and the Project Schedule. Use updated schedules, if revisions were made.
   b. Include amounts of fully executed Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
4. Transmittal: Submit signed originals of each Application for Payment by a method ensuring receipt within 24 hours.
5. Waivers of Mechanics Lien: With each application for Payment, submit waivers of mechanics lien from every entity who is lawfully entitled to file a mechanics lien arising out of the Contract and related to the Work covered by the payment.
   a. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   b. When an application shows completion of an item, submit final or full waivers.
   c. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to the Owner.
6. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
   a. Executed Contract.
   b. List of subcontractors.
   c. List of principal suppliers and fabricators.
   d. Contract Cost Breakdown and Schedule of Values.
   e. Master Project Schedule.
   f. Copies of building permits.
   g. Copies of authorizations and licenses from governing authorities for performance of the Work.
   h. Certificates of insurance and insurance policies.
7. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.
   a. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
   b. Administrative actions and submittals that shall precede or coincide with this application include:
      1. Occupancy permits and similar approvals.
      2. Warranties (guarantees) and maintenance agreements.
      3. Test/adjust/balance records and startup performance reports.
      4. Meter readings.
      5. Changeover information related to Owner's occupancy, use, operation, and maintenance.

6. Final cleaning.
7. Advise on shifting insurance coverage's.
8. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

8. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final Application for Payment include the following:
   a. Completion of Project closeout requirements.
   b. Completion of items specified for completion after Substantial Completion.
   c. Ensure that unsettled claims will be settled.
   d. Ensure that incomplete Work is not accepted and will be completed without undue delay.
   e. Transmittal or required Project construction records to the Owner.
   f. Proof that taxes, fees, and similar obligations were paid.
   g. Removal of temporary facilities and services.
   h. Removal of surplus materials, rubbish, and similar elements.

C. CHANGE ORDER REQUESTS

1. All Requests for Change Order shall be submitted on the General Contractor's Letterhead.
2. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect.
3. Change Order Proposal Requests.
   a. Owner Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract time, will be issued by the Architect with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary. This process shall include the following:
      1. Detailed description of the change, products and location of the change in the Project.
      2. Supplementary or revised Drawings and Specifications.
      3. The duration for implementing the change.
      4. Such request is for information only, and is not an instruction to execute the changes, not to stop Work in progress.
      6. Unless otherwise indicated in the proposal request, within 14 days of receipt of the proposal requires, submit to the Architect, an estimate of cost necessary to execute the proposed change.
   b. The General Contractor may initiate proposed changes by submitting a written notice to the Architect containing:
      1. Description of the proposed change.
      2. Statement of the reason for making the changes.
      3. Statement of the effect on the Contract Sum and the Contract Time.
      4. State of the effect on the work of other Contractors.
      5. Documentation supporting any change in Contract Sum and the Contract Time, as appropriate.

D. CONSTRUCTION CHANGE DIRECTIVE

1. Construction Change Directive: When the Owner and General Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Architect may issue a Construction Change Directive Document, instructing the General Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   a. At completion of the change, the General Contractor shall submit itemized accounting and supporting data as provided in this Section.
   b. Architect will determine the allowable cost of such work, as provided by in the General and Supplementary Conditions.

END OF SECTION 01 29 76

SECTION 01 31 19 – PROJECT MEETINGS

A. SUMMARY

1. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
    1. Pre-construction conferences.
    2. Pre-installation conferences.
    3. Progress meetings.

B. RELATED REQUIREMENTS

1. Section 01 32 16 – Schedules and Reports
2. Section 01 33 00 – Submittal Procedures
3. Individual Specification Sections: Pre-Installation Meetings

C. DESCRIPTION

1. To enable orderly review during progress of the Work and to provide for systematic discussion of construction issues, the Architect will conduct Project Meetings throughout the construction period.
2. The General Contractor and principal subcontractors shall be required to have present at each of the following project meetings a representative acceptable to the Architect and Owner. The designated representative shall have sufficient authority and knowledge to make decisions for the Contractor he is representing on matters affecting this Project.
3. Contractors or representative unable to attend a specified meeting shall have an acceptable alternate representative designed or shall notify the Architect not less than 7 days prior to data of meeting.

D. PRE-CONSTRUCTION CONFERENCE

1. The purpose of this meeting is to review submittals that will be required by the Contractors and to review the project procedures that are to be followed during the progress of construction.
2. The Architect will send advance written notice of the Pre-Construction Conference date, time, and place to the various successful bidders. General Contractor shall require principal subcontractors to attend.
3. Architect will schedule and administer the Pre-Construction Conference for exchange of preliminary submittals, clarification of Owner, Architect and Contractor responsibilities, and for review of administrative procedures.
4. Architect shall prepare minutes and record significant discussions and agreements of each conference, and distribute the record of the meeting to everyone concerned.

E. PRE-INSTALLATION CONFERENCES

1. Conduct a pre-installation conference at the project site before each construction activity that requires coordination with other construction, as outlined in the technical sections.
2. The Architect will schedule a pre-installation conference, upon Contractor notification, at the project site before each construction activity that requires coordination with other construction.
3. Review conditions of installation, preparation, and coordination with related work.
4. Attendees: The Authorized representative of the Owner, Architect and their consultants; General Contractor, appropriate subcontractor(s), installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
5. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

F. JOB PROGRESS MEETINGS

1. Job Progress meetings will be established on a weekly basis, or more frequent as determined by the Architect, to review the progress of construction, possible delays, problems, and projected construction activity. The General Contractor and principal subcontractors are required to attend progress meetings. Noted participants failing to be represented at project meetings, when specifically requested, will be taken into consideration when payment applications are being considered for approval by the Architect/Engineer.
   a. Architect shall initiate and schedule Progress Meetings.
   b. General Contractor shall require principal sub-contractors to attend.
   c. The progress and schedule of the General Contractor and principal subcontractors shall be coordinated at this meeting. The representatives of the General Contractor and subcontractors present shall have the authority to change the Contractor's work schedule or authorize work with the consent of the Architect. If the noted participants fail to attend this meeting, it shall be his responsibility to obtain the information discussed at the meeting. Attendance at the meetings is required for Contractors' payment.
2. The Architect will schedule and administer Project progress meetings regularly throughout the project. Times and dates shall be agreed upon by the Architect, Owner and General Contractor.
3. Project meetings shall be held at the job site in a location designated by the Owner and Architect.
4. The Architect will prepare agenda with copies for participants, preside all meetings, record minutes and distribute copies to the participants and those affected by decisions made at meetings.
5. Attendance: General Contractor's Project Manager and Project Superintendent, Owner and Architect. All as appropriate to address agenda topics for each meeting. Major subcontractors and suppliers shall attend when requested by the Architect or General Contractor.
6. At each Progress Meeting, the General Contractor shall present to Owner and Architect any questions that have arisen as a result of carefully examining the Drawings and Specifications. Architect shall present any guides and advice or administrative procedures they wish to have followed for orderly and expeditious prosecution and administration of the Work. Agenda shall include at least the following:
   a. Review and correct or approve minutes of the previous Progress Meeting.
   b. Review other items of significance that could affect progress.
   c. Include topics for discussion as appropriate to the current status of the Project.
   d. Master Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Master Construction Schedule, whether on time, ahead or behind schedule. Determine how activities behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities shall be completed within the Contract time.

END OF SECTION 01 31 19

SECTION 01 32 16 – SCHEDULES AND REPORTS

A. GENERAL REQUIREMENTS

1. The Work under this Contract shall be planned, scheduled, executed, reported and accomplished using the Critical Path Method (hereinafter referred to as CPM), in workdays, unless otherwise specifically provided in the Contract Documents.
2. The primary objectives of the CPM Scheduling requirements are: (1) to insure adequate planning and execution of the Work by contractor; (2) to assist Owner and Architect in evaluating progress of the Work; (3) to provide the optimum coordination by Contractor of his trades, Subcontracts and Suppliers, and of his Work with the work or services provided by any separate contractors; (4) to permit the timely or detection of events or occurrences which may affect the timely prosecution of the Work; and (5) to provide a mechanism or tool for use by the Owner, Architect and Contractor in determining and monitoring any actions of the Contractor which may be required in order to comply with the requirements of the Contract Documents relating to the completion of the various portions of the Work by the Specific Dates specified in the Contract Documents.
3. The General Contractor is responsible for determining the sequence of activities, the time estimates of the detailed construction activities and the means, methods, techniques and procedures to be employed. The Master Construction Schedule shall represent each of the Milestone Dates indicated in Specification Section 01 15 00, and include the General Contractor's best judgment of how he will execute the Work in compliance with the Contract requirements. General Contractor shall ensure that the Master Construction Schedule is current and accurate and is properly and timely monitored, updated and revised as Project conditions and the Contract Documents may require.
4. General Contractor shall consult with all other Contractors, principal Subcontractors and Suppliers relating to the preparation of the construction plan and Master Construction Schedule. All principal subcontractors shall receive copies of the Master Construction Schedule, which relates to their work and shall be continually advised of any updates or revisions to the Master Construction Schedule as the work progresses. When the General Contractor submits the Master Construction Schedule to the Architect or makes any proposed updates or revisions to such Schedule, he shall consult with and have the concurrence of all principal Subcontractors, and Suppliers. General Contractor shall be solely responsible for ensuring that all Subcontractors and Suppliers comply with the requirements of the Master Construction Schedule for their portions of the Work.
5. The Master Construction Schedule shall provide the basic data relating to activities, durations and sequences. This data shall reflect the actual construction plan for the Project, and shall fully comply with all requirements of the Contract Documents.
6. When there are separate contractors working concurrently on the Project whose work must interface or be coordinated, the General Contractor shall coordinate his activities with the activities of the other subcontractors, and shall, prior to the submission of the Master Construction Schedule to the Architect, obtain written approval of the Master Construction Schedule by the separate contractors. If the General Contractor is unable to obtain such written approval by the separate contractors after his best efforts to do so, or if a conflict occurs that cannot be resolved by mutual agreement between any subcontractors, the Architect and Owner shall make a determination of the schedule, which shall be binding upon all Contractors; or, Owner reserves the right to seek other qualified responsible Contractors capable of achieving and committing to the proposed Master Construction Schedule.
7. The General Contractor shall be responsible for the drafting and computerization of principal Subcontractor's data for the Master Construction Schedule. The Master Construction Schedule shall be developed utilizing a current version of one of the following planning programs:
   a. Primavera Project Planner.
   b. Microsoft Project Works.

8. It is understood and agreed that the Master Construction Schedule is to represent the General Contractor's best plan and estimate for the Work; however, the General Contractor acknowledges that the Construction Schedule may have to be revised from time-to-time as progress proceeds. Any changes, modifications or adjustments made by the General Contractor to the Master Construction Schedule shall be in full compliance with all requirements of the Contract Documents.
9. The General Contractor acknowledges and agrees that the Master Construction Schedule must be flexible in order to accommodate and allow for coordination with the operations of the Owner and the work of separate contractors relating to the Project. The Owner and Architect will review the Master Construction Schedule for compatibility with Owner operations and the work of separate contractors. The General Contractor agrees to hold meetings with the Owner, Architect and separate contractors to resolve any conflicts between Master Construction Schedule and the operations of the Owner or work of separate contractors. Contractor agrees to fully cooperate with the Owner, Architect and separate Contractors to resolve such conflicts and to revise the Master Construction Schedule as reasonably required.
10. In order to maintain the orderly progress of the work performed on the Project, the Architect reserves the right to determine, in his sole discretion, the priority between the Work performed by the General Contractor and the work of any separate contractors or Owner's operations; this decision shall be final and binding upon the General Contractor and shall not be a cause for extra compensation or an extension of time, except where an extension of time is granted because or delay for which Contractor is otherwise entitled to an extension under the Contract Documents. Provided, however, that this right shall not be exercised by the Architect unless: (1) the determination is necessary, in the opinion of the Architect, because of Project conditions; and (2) General Contractor and any separate Contractors cannot otherwise agree upon such priority of schedule construed as relieving the Contractor of his obligation to cooperate with any separate contractors on the Project.
11. If the Master Construction Schedule indicates that the Owner or a separate contractor is to complete an activity or perform certain preceding work by a particular date, or within a certain duration, Owner and Architect, or any separate contractor shall not be bound to said date or duration unless Owner expressly and specifically agrees in writing to same. The review and approval or acceptance by Owner or Architect of the Master Construction Schedule, does not constitute an agreement by Owner or Architect of any start or finish date in the schedule or specific durations or sequences for activities of the Owner or any separate contractor; provided, however, that noting herein shall be construed as modifying or changing, or excusing the performance of Contractor or required portions of the Work by the Specific Dates as set forth in the Contract Documents.
12. The Specific Dates or Milestones Dates set forth in the Contract Documents represent only the major items of Work and may include interface dates with the operations of the Owner, the work of separate contractor or others. Milestone Dates are Contract requirements and are of the essence to this Contract and to the coordination of the Work by Contractor. Milestone Dates represent the latest allowable start or completion time for those portions of the Work to which each Specific Date relates. The Milestone Dates are not intended to be complete listing of all Work under this Contract or of all interfaces with work performed by other separate contractors, the Owner or others. The General Contractors shall determine the time requirements for all such interfaces and shall be responsible for planning, scheduling and coordinating the Work in order to complete in accordance with those requirements.
13. Approval or acceptance by the Owner or Architect of the Master Construction Schedule, or any revisions or updates thereto, is advisory only and shall not relieve the General Contractor of the responsibility for accomplishing each portion of the Work within each and every applicable Milestone Date. Omissions and errors in the approved or accepted Construction Schedule, or any revisions or updates shall not excuse performance, which is not in compliance with the Contract. Approval by the Owner or Architect in no way makes the Owner or Architect an insurer of the reliability, accuracy or feasibility of the Master Construction Schedule nor liable for time or cost overruns flowing from such omissions or errors. It is understood and agreed that the General Contractor cannot rely upon any informal or constructive

acquiescence or approval of the Master Construction Schedule by Owner or Architect has any right or power to agree to any schedule commitment or obligation on the part of the Owner or Architect except as set forth expressly in the Contract Documents.

14. Should the General Contractor intend or plan to complete the Work, or any portion thereof, earlier than any applicable Specific Date or the Contract Time, Contractor shall give timely and reasonable notice of this fact to the Architect. Architect shall have the sole discretion to agree to or reject such early completion plan by any Contractor. Owner and Architect shall have no duty or obligation to agree to, or to cooperate with contractor regarding any early completion plan or proposal by Contractor and shall not be liable for any damages of Contractor because of the rejection by Owner of said plan.
15. Unless otherwise specifically provided in the Contract Documents, Contractor acknowledges that Owner and Architect have contemplated in their planning and initial scheduling of the Project, and their budgeting for professional services, that the Work will be performed on a 5-day work week basis, utilizing a single 8-hour shift per day. Owner and Architect shall have the sole discretion of approving or rejecting a variance in the workweek, number of shifts, or shift length. Unless otherwise agreed by Owner or Architect, the General Contractor shall bear the cost of, and pay the Owner, for additional staff and supervisory personnel, including but not limited to the services of Architect and the Design Consultant necessary to support any variance in the contemplated work week, number of shifts or shift length.

B. PRE- AWARD ACTIVITIES

1. Upon receipt by the General Contractor of the Intent to Award, and until the Master Construction Schedule is approved by Owner and Architect, the General Contractor and principal subcontractors shall proceed with the Work in accordance with the Contract Documents.
2. Pre-Award Meetings: The General Contractor shall, upon notification from the Architect, attend all pre-award meetings relating to the Schedules and Reports requirements for this Project. The pre-award meeting is designed to assist the General Contractor in planning the Work and in developing the Master Construction Schedule.
3. Among other things, the Owner and Architect will review: The objectives of the Schedules and Reports requirements; the procedures and requirements for the preparation of the Master Construction Schedule and the Contract Cost Breakdown by Contractor; how the Requirements of the Contract Documents will be monitored and enforced by the Owner and Architect; long-lead items and time requirements for work by Subcontractors will be identified.
4. Should the General Contractor or principal subcontractors and suppliers fail or refuse to attend pre-award meeting(s), Owner shall have the right to terminate Contractor for default pursuant to the provisions of the General Contracts.

C. CONTRACT COST BREAKDOWN

1. Within ten (10) calendar days after Notice to Proceed, the General Contractor shall submit to the Architect a Contract Cost Breakdown for review, allocating a dollar value for the activities on the Master Construction Schedule in accordance with the requirements of the General Conditions. The dollar value for the activities shall be the cost of the work of the activity including labor, materials and pro rata contribution of General Conditions requirements, overhead and profit. The sum of all activity costs shall equal the total Contract Sum. The Contractor shall revise the Contract Cost Breakdown as necessary to gain the approval of the Architect and the Owner.

D. MASTER CONSTRUCTION SCHEDULE

1. Prior to awarding Contracts, a Master Construction Schedule, including Contract Milestone dates shall be established. The General Contractor shall be responsible for the overall coordination and development of the Master Project Schedule, with complete signed agreement by all principal subcontractors. The Master Construction Schedule shall represent all of the General Contractor's best

judgment of how to execute and complete the work in compliance with the Contract Milestone Dates and any specific dates stipulated in the Contract Documents.
The Master Construction Schedule shall be developed utilizing a current version of one of the following scheduling software:
a. Primavera Project Planner
b. Microsoft Project Works.

E. CONSTRUCTION SCHEDULE CONTENT

1. The Master Construction Schedule shall consist of a time-scaled, detailed graphical logic network representation identifying all of the activities which are part of the Work under the General Contractor's construction plan.
2. The graphic logical network shall include, but not be limited to, the following information:
   a. Each activity will be coded with sufficient detail so as to distinguish the type of work or specification section.
3. The network diagram will show the interdependencies of the work activities and the major points of interface or interrelation with the activities of other contracts.
4. Outage schedules for exiting utility services that will be interrupted during the performance of the work. Allow a seven (7) workday window for each service shutdown that may affect other buildings on campus. All shutdowns will require an approved outage required that must be submitted at least seventy-two (72) h ours in advance.
5. Acquisition and installation of equipment and materials, supplies and/or installed by the Owner or separate contractors:
   a. Material to be stored on site; and
   b. Milestone Dates.
   c. For all major equipment and materials to be fabricated or supplied for the Project, the Master Construction Schedule shall show a sequence of activities including:
   d. Preparation of Shop Drawings, sample submissions, and O&M manuals:
   e. A reasonable time for review of Shop Drawings and samples or such time as specified in the Contract Documents;
   f. Shop fabrication, delivery and storage;
   g. Erection or installation; and
   h. Testing of equipment and materials.
6. The Master Construction Schedule shall include completion dates for the Work that are no later than the required Milestone Dates.
7. All activity durations shall be given in workdays.

F. UPDATING OF CONSTRUCTION SCHEDULE/PROGRESS REPORTS

1. On a periodic basis, the General Contractor shall meet at the Project Site with the Architect to review status of actual progress. Said report shall set forth up-to-date and accurate progress data, shall be based upon the General Contractor's best judgment and shall be prepared by the General Contractor in consultation with all principal subcontractors and Suppliers.
2. The progress report shall show the activities or portions of activities, started and/or completed during the reporting period, the actual start, finish dates and percent completes for these activities, remaining durations and/or estimated completion dates for activities currently in progress.
3. The General Contractor shall submit a narrative report with the updated progress analysis which shall include, but not be limited to, a description of problem areas, current and anticipated delaying factors and their impact, explanations of corrective actions taken or planned, and newly planned activities or changes in sequence, and proposed logic for a Recovery Schedule, if required, as further described herein. The report shall also include:
   a. A narrative describing actual work accomplished during the reporting period;

b. A list of major construction equipment used and the total number of men by craft actually engaged in the Work during the reporting period;
c. A manpower and equipment forecast for the succeeding thirty (30) days;
d. A list of contractor-supplied materials and equipment, indicating current availability and anticipated jobsite delivery dates;
e. Schedule Reports: Initial and subsequent Schedule Reports will contain the following minimum information for each activity;
   1. Activity number, description and estimated duration in workdays;
   2. Early and late finish dates;
   3. Percentage of each activity completed as of each report;
   4. Remaining days ahead or behind schedule;
   5. Responsibility for activity. Actual start and finish dates shall be indicated for each activity, as appropriate.
f. Cost Reports: Initial and subsequent Cost Reports will include the following information for each activity, sorted by trade activity:
   1. Activity number and description;
   2. Percentage of value of Work in place against total value;
   3. Total cost of each activity;
   4. Value of Work in place since last report;
g. Value of Work in place to date;
h. Value of uncompleted Work.

4. The General Contractor shall be solely responsible for expediting the delivery of all materials and equipment to be furnished, so that the progress of construction shall be maintained according to the approved Master Construction Schedule. The General Contractor shall notify the Architect in writing, and in a timely and reasonable manner, whenever Contractor determines or anticipates that the delivery date of any material or equipment to be furnished by subcontractor will be later than the delivery date indicated by the Master Construction Schedule, or required consistent with the completion requirements of this Contract, subject to schedule updates as herein provided.

G. RECOVERY SCHEDULE

1. Should the Master Construction Schedule show at any time during the General Contractor's performance, in the sole opinion of the Architect, that the General Contractor is fourteen (14) or more workdays behind schedule for any Milestone Date, the General Contractor shall prepare a Recovery Schedule at no additional cost to the Owner, explaining and displaying how to reschedule his Work in order to regain compliance with the Master Construction Schedule during the immediate subsequent pay period.
2. If the Contractor believes that all of the time can be recovered during the subsequent pay period the Contractor will be permitted to prepare a Recovery Schedule. However, if the Contractor believes it will take more than thirty (30) workdays to recover all of the lost time, he shall prepare and submit a request for revision to the Master Construction Schedule and comply with all of the requirements for a Schedule Revision.

H. SCHEDULE REVISIONS

1. Should the General Contractor desire to or otherwise be required under the Contract Documents to make modifications or changes in his method of operation, his sequence of Work or the durations of the activities in his Construction Schedule, he shall do so in accordance with the requirements of the Contract Documents. The Architect must approve revisions to the approved Master Construction Schedule in writing.
2. The General Contractor shall submit requests for revisions to the Master Construction Schedule to the Architect, together with written rationale for revisions and description of logic for rescheduling work and

maintaining the Specific Dates listed in the Contract Documents. Proposed revisions acceptable to the Architect and Owner will be incorporated into next update of the Master Construction Schedule.

3. Prior to the submission by the General Contractor of his proposed schedule revisions, he shall meet with and gain written approval of all other subcontractors to make the revisions.

I. LIST OF SUBCONTRACTORS, SUPPLIERS AND MANUFACTURERS

1. The General Contractor shall submit to the Architect, prior to award of Contract, a list of subcontractors, suppliers and manufacturers participating on the Project. The list shall be complete with names and addresses.

J. COORDINATION

1. The General Contractor shall coordinate the Work with that of all sucontactors and shall cooperate fully with the Architect and Owner in maintaining orderly progress toward completion of work as scheduled. The General Contractor's decisions regarding priority of the Work of all contractors at the site shall be final and shall not be cause for extra compensation or extension of time, except where extension of time is granted because of delay for which the Contractor is otherwise entitled to an extension of time under the Contract Documents.

END OF SECTION 01 32 16

SECTION 01 33 00 – SUBMITTAL PROCEDURES

A. SUMMARY

1. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
   a. Shop drawings.
   b. Product data.
   c. Samples.

B. SUBMITTAL PROCEDURE

1. Submittals, including those specified herein shall be submitted to the Architect for review.
2. Contractors on this Project shall provide all submittals in strict accordance with the requirements of this Section. Where a submittal is required by a Contractor but assistance needed from others, Contractors shall participate and cooperate to expedite each submittal.
3. Where submission of samples, shop drawings, or other items are required from suppliers or subcontractors, it shall be the responsibility of the Contractor for whom the subcontractor is executing the Work to see that the submittal items required are complete and properly submitted, and corrected and resubmitted at the time and in the order required so as not to delay the progress of the Work. All Submittals shall be made through the Prime Contractor.
4. The Contractor shall check shop drawings, samples, and other submittals and submit them to the Architect with a letter of transmittal giving his approval, comments, and suggestions. Each transmittal shall include the following information:
   a. Date submitted.
   b. Project title and number.
   c. Contractor's name and address.
   d. Identification by Specification Section and quantity submitted for each submittal including name of subcontractors, manufacture or supplier.
   e. Notification of deviations from the Contract Documents for each submittal.
   f. Contractor's written approval marked on each submittal.
5. The Contractor shall prepare, review and stamp with his approval and submit, with reasonable promptness or within the specified time periods and in orderly sequence so as to cause no delay in the Work or in the Work of another Contractor, submittals required by these Contract Documents or subsequently required by modifications.
6. The Architect shall review and take action on submittals with reasonable promptness, so as to cause no delay in the progress. A reasonable period of time in accordance with approved project schedule for review of and action taken on submittals shall be as specified herein, but in no case shall it be less than 10 calendar days from the time the submittal is received by the Architect until the time the submittal is marked and forwarded or returned. Contractors shall allow sufficient mailing time for submittals.

C. SHOP DRAWINGS

1. Submit newly prepared information drawn accurately to scale. Highlight, encircle or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
   a. Auto-cad drawings may be available from the Architect. The Contractors requiring this service must contact the Architect to verify availability.
2. Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
   a. Advertising brochures will not be accepted as shop drawings.

b. Erection and setting drawings as referred to in these Specifications will be considered as shop drawings and shall be submitted along with detailed shop drawings.
c. Where schedules are required to indicate locations, they shall be submitted as part of the shop drawings package for that item.
d. Shop drawings and schedules shall repeat the identification shown on the Contract Drawings.
e. The Contractor shall check all shop drawings, samples and other submittals and submit them to the Architect, giving his approval and/or comments and suggestions.
f. Include the following information:
    1. Dimensions and clearances required.
    2. Identification of products and materials included by sheet and detail number.
    3. Compliance with specified standards.
    4. Notation of coordination requirements.
    5. Notation of dimensions established by field measurements.
    6. Clearly mark each copy of identify pertinent materials.
    7. Show performance characteristics and capacities.
    8. Note variances from the Contract Documents including manufacturer's recommended changes to sequencing and to piping and control diagrams.

3. Preparation of Submittals: Provide permanent marking on each submittal to identify project, date, Contractor, Subcontractor, submittal name and similar information to distinguish it from other submittals. Show Contractor's executed review and approval marking and provide space for Architect's "action" marking. Package each submittal appropriately for transmittal and handling. Submittals that are received from sources other than the General Contractor may be returned "without action". Package each submittal according to applicable specification section. Use a separate transmittal for each submittal.
4. By approving and submitting shop drawings, the Contractor thereby represents that he has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents prior to submitting to the Architect. Submittals that are received from sources other than the General Contractor will be returned without review, requiring re-submittal.
5. The Contractor shall make corrections required by the Architect and shall resubmit the required number of corrected copies of shop drawings until approved or accepted. The Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than the corrections requested by the Architect on previous submissions.
6. The Architect will review shop drawings only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate review of an assembly in which the item functions.
    a. Only shop drawings, product data and samples marked "No Exceptions Taken" or "Note Marking/Confirm" shall be considered "final" and used in conjunction with the work of the Project.
7. The Architect's review of shop drawings shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the shop drawings.
    a. The Architect's review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and qualities, or for substantiating instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architects approval of a specific item shall not indicate approval of an assembly of which it is a component.

8. Notations and remarks added to shop drawings by the Architect are to insure compliance to Contract Documents and do not imply a requested or approved change to contract cost.
9. Should deviations, discrepancies or conflicts between shop and contract drawings and Specifications be discovered, either prior to or after review, Contract Documents shall control and be followed.
10. Submit electronic PDF files of all shop drawings and product data submittals.
11. Shop drawings will be marked as follows: Contractor shall take the following action for each respective marking:
    a. "APPROVED" or "NO EXCEPTIONS TAKEN" – Copies will be distributed as indicated under above schedule.
    b. "APPROVED AS NOTED" or "NOTE MARKINGS/CONFIRM" – Final but Restricted Release; Contractor may proceed with fabrication, taking into account the necessary corrections on submittal and with Contract Documents. Corrected shop drawings shall be resubmitted before fabrication of this Work is completed or materials are delivered to the Project site.
    c. "REVISE AND RESUBMIT " or "NOTE MARKINGS/RESUBMIT" – Contractor may proceed with fabrication, taking into account the necessary corrections. Corrected shop drawings shall be resubmitted before fabrication of this work is complete to obtain a different action marking. Do not follow drawings marked "Resubmit" to be used in connection with installation of the Work.
    d. "REJECTED" – Contractor will be required to resubmit shop drawings in their entirety. No fabrication or installation shall be started until shop drawings so marked have been completely revised, resubmitted and marked by Architect according to preceding Paragraphs.

D. <u>SCHEDULE OF VALUES</u>

1. Contractor shall prepare and submit to the Architect a Schedule of Values for approval within 14 days after award of Contract. The contract breakdown shall be the same form as used in submitting request for Payments as covered in Applications for Payment of the General and Supplementary Conditions. Each item of work shall have indicated a separate cost for labor and material. Allowances shall be noted as separate line items.
2. Schedule of Values shall be coordinated with the Construction Schedule such that the percentages of work completed closely relates to the values for the work shown on the request for payments.
3. At the beginning of the project, the Contractor shall prepare a schedule of monthly payments showing the amount the Contractor may require for Work proposed to be completed.

E. <u>PRODUCT DATA</u>

1. Collect Product Data into a single submittal for each element of construction or system. Product data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves.
    a. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
        1. Manufacturer's printed recommendations.
        2. Compliance with trade association standards.
        3. Compliance with recognized testing agency standards.
        4. Application of testing agency labels and seals.
        5. Notation of dimensions verified by field measurement.
        6. Notation of coordination requirements.
    b. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
        1. Preliminary Submittal: Submit a preliminary single copy of Product Data where selection of options is required.

c. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators and others required for performance of construction activities. Show distribution on transmittal forms.
   1. Do not proceed with installation until a copy of Product Data is in the Installer's possession.

2. In compliance with the OSHA Hazard Communication Standard (1910, 1200, 08-24-1987) Contractors are required to submit to the Architect, MSDS (Material Safety Data Sheets) for ALL products classified as hazardous that their firm has knowledge that they will be furnishing, using or storing on the jobsite during the duration of this Project in accordance with OSHA standards.

F. <u>SAMPLES</u>

1. The Contractor shall submit to the Architect triplicate samples to illustrate materials or workmanship, colors and textures, and establish standards by which the Work will be judged.
   a. Submit full size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
      1. Mount or display samples in the manner to facilitate review of quantities indicated. Prepare samples to match the Architect's sample. Include the following:
         a. Specification Section number and reference.
         b. Generic description of the sample.
         c. Sample Source.
         d. Product name or name of the manufacturer.
         e. Compliance with recognized standards.
         f. Availability and delivery time.
      2. Submit samples for review of size, kind, color, pattern and texture. Submit samples for final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
         a. Where variation in color, pattern, texture and other characteristic is inherent in the materials or product represented, submit at least 3 multiple units that show approximate limits of the variations.
         b. Refer to other Specification sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
2. By approving and submitting samples, the Contractor thereby represents that he has determined and verified materials, catalog numbers and similar data, and that he has checked and coordinated each sample with the requirements of the Work and of the Contract Documents prior to submitting to the Architect.
3. The Contractor shall resubmit the required number of correct or new samples until approved. The Contractor shall direct specific attention in writing or on resubmitted samples to revisions other than the changes requested by the Architect on previous submissions.
4. The Architect will review samples but only for conformance with the design concept of the Project and with the information given in the Contract Documents. The Architect's review of a separate item shall not indicate approval of an assembly in which the item functions.
5. The Architect's action shall not relieve the Contractor of responsibility for deviations from the requirements of the Contract Documents unless the Contractor has informed the Architect in writing of the deviation at the time of submission and the Architect has given written approval to the specific deviation, nor shall the Architect's action relieve the Contractor from responsibility for errors or omissions in the samples.

6. Unless otherwise specified, samples shall be in triplicate and of adequate size to show function, equality, type, color, range, finish and texture of material. When requested full technical information and certified test data shall be supplied.
   a. Each sample shall be labeled, bearing material name and quality, the Contractor's name, date, project name and other pertinent data.
   b. Transportation charges to and from the Architect's office must be prepaid on samples forwarded. The Architect shall retain samples until the Work for which they were submitted has been accepted.
7. Materials shall not be ordered until final review is received in writing from the Architect. Materials shall be furnished, equal in every respect to reviewed samples. Where color or shade cannot be guaranteed, the manufacturer shall indicate the maximum deviation. Work shall be in accordance with the final reviewed samples.

END OF SECTION 01 33 00

SECTION 01 45 00 – QUALITY CONTROL

A. SUMMARY

1. This Section includes Contractors' responsibilities of quality control services and extent of quality control sources to be performed.
2. Related Work Specified Elsewhere
   a. Section 01 45 29 – Testing Laboratory Service.
   b. Section 01 71 23 – Field Engineering.
3. Definitions: Quality control services include inspections and tests, and actions related thereto, including reports, but do not include contract enforcement activities performed directly by Architect/Engineer. Quality control services include those inspections and tests and related actions performed by independent agencies and governing actions performed by independent agencies and governing authorities, as well as directly by Contractor.
   a. Testing service is required to immediately notify Architect of discrepancies observed in the Work performed and to be performed to the Contract Documents.
4. Inspections, tests and related actions specified in this Section and elsewhere in Contract Documents are not intended to limit Contractor's quality control procedures, which facilitate compliance with requirements of Contract Documents.
5. Requirements for quality control services by Contractor, as requested or to be requested by Architect/Engineer, Owner, governing authorities or other authorized entitles are not limited by provisions of this section.
6. Contractors shall review and become familiar with the requirements of Tests and Inspections, of the General Conditions covering the provisions for testing the Work.

B. CONTRACTOR RESPONSIBILITIES

1. Contractor shall coordinate with independent testing agency performing inspections, test and quality control services.
   a. General Contractor will schedule services of independent testing agency to perform services so specified.
   b. Owner will engage and pay for services of independent agency to perform inspections and tests.
   c. Except where specifically provided as indicated by another entity, inspections, tests, and similar quality control services, including those specified to be performed by independent agency are the Owner's responsibility, and costs thereof are not to be included in contract sum.
2. Retest Responsibility: Where results required inspection, test or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are responsibility of Contractor. Retesting of work revised or replaced by Contractor is Contractor's responsibility, where required tests were performed on original work.
3. Responsibility for Associated Services: Contractor is required to cooperate with independent agencies performing required inspections, tests and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.
4. Coordination: Contractor and each engaged independent agency performing inspections, tests and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests. Scheduling of times for inspections, tests taking of samples and similar activities is Contractor's responsibility.
5. Sampling and testing are required for the following Sections of Work and shall be performed by an independent testing lab and paid for (by the Owner).

a. Section 31 00 00 – Earthwork: Soil testing and inspection service during earthwork operations for sub-grades and fill.
b. Section 03 30 00 – Cast-In-Place Concrete: Inspection of reinforcing steel placement.
c. Section 03 30 00 – Cast-In-Place Concrete: Field quality control of concrete.
d. Section 03 30 00 – Cast-In-Place Concrete: Tests for concrete materials and mix design tests.
e. Section 03 30 00 – Cast-In-Place Concrete: Testing of FF/FL floor tolerances.
f. Section 04 20 00 – Masonry Mortar: Field quality control of mortar.
g. Section 04 20 00 – Masonry Grout: Field quality control of grout.
h. Section 04 20 00 – Masonry Units: Field quality control of unit masonry and masonry assemblies.
i. Section 05 12 00 – Structural Metal Framing: Field quality control for welds and bolted connections.
j. Section 05 12 00 – Structural Metal Framing: Field quality control for high strength steel torque bolted connections.
k. Section 05 12 00 – Structural Metal Framing: Field quality control for structural steel alignment.

C. QUALIFICATION OF LABORATORY

1. Shall meet "Recommended Requirements of Independent Laboratory Qualifications," published by American Council of Independent Laboratories. For concrete and steel the laboratory shall comply with the basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."
2. Submit copy of report of inspection of facilities made by Materials Reference Laboratory of National Bureau of Standards during most recent tour of inspection; with memorandum of remedies of deficiencies reported by inspection.
3. Testing equipment shall be calibrated at maximum 12-month intervals by devices of accuracy traceable to either:
   a. National Bureau of Standards.
   b. Accepted values of natural physical constants.
   c. Submit copy of certificate of calibration, made by accredited calibration agency.
4. Refer to Section 01 45 19 – Testing Laboratory Service for additional requirements.

D. SUBMITTALS

1. Submit two (3) copies of test reports directly to the Architect from the approved testing services.

E. SOIL COMPACTION TESTING

1. The Contractors for the Work of Section 31 00 00 – Earthwork, Site and Building shall cooperate and coordinate with the soil testing and inspection service for quality control testing during earthwork operations as specified under Section 31 00 00, as follows:
   a. Field density test reports.
   b. One optimum moisture-maximum density curve for each type of soil encountered.
   c. The Contractor shall arrange for Soils Engineer to be on the site for observation and testing during times when the following operations are being performed.
      1. Compaction of sub grades and fill, including utility backfill. During compaction operations, the Soils Engineer shall carefully monitor existing foundations to detect possible foundation movements. If movement is detected, Work shall be stopped and the Architect immediately notified.
2. Excavation, Fill and Backfill Contractors shall cooperate and coordinated with the soil testing and inspection service to confirm soil-bearing adequacy prior to placement of reinforcing steel or concrete as specified.
3. Percentage of Maximum Density Requirements: See Specification Section 31 00 00.

4. Quality Control Testing during Construction: Testing service must inspect and approve sub grades and fill layers before further construction work is performed thereon. Tests of sub grades and fill layers will be taken as follows:
   a. Footing Sub grade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing sub grade may be based on a visual comparison of each sub grade with related tested strata, when acceptable to Architect, except that a minimum of one test shall be performed for each 15,000 sq. ft. of building area.
   b. Paved Areas and Building Slab Sub grade: Make at least one field density test of sub grade for every 2,000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.
   c. Foundation and Retaining Wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.
   d. Trench Backfill: For each compacted backfill layer make one field density test between each drainage structure.
5. Soil Bearing Adequacy: Refer to Structural Drawings for design bearing pressure assumed in the design of footings and foundations.
6. If, in the opinion of the Architect, based on reports of testing service and inspection, sub grade or fills which have been placed are below specified density, additional compaction work and testing shall be provided by the Contractor for the Section of Work involved at no additional expense, until sub grade or fills meet or exceed specified density.

F. <u>INSPECTION OF REINFORCING STEEL PLACEMENT</u>

1. The Contractor for the Work of Section 03 30 00 – Cast-In-Place Concrete, shall cooperate and coordinate with the testing laboratory to perform field inspection of the placement of reinforcing steel prior to, and in some specified instances during the placement of concrete in all reinforced concrete structures, unless specifically noted otherwise.
2. Inspection shall include the following:
   a. All structures:
      1. Size of all reinforcing bars.
      2. Measurement of bar laps.
      3. Spacing of reinforcing bars.
      4. Measurement of reinforcing concrete cover.
      5. Adequacy of reinforcement ties to prevent movement during concrete placement.
      6. Placement of reinforcing chairs, bolsters, and concrete blocks supporting reinforcement.
      7. Condition of reinforcing free of corrosion scale, grease, oil, and other foreign materials which would reduce bond of concrete to reinforcement.
   b. Slabs-on-Grade:
      1. Nominal size of welded wire fabric.
      2. Measurement of fabric lap.
      3. Type, size and spacing of supports for welded wire fabric.
      4. Adequacy of maintaining welded wire fabric in correct position during the concrete placement. If concrete workers walk on fabric during concrete placement, is fabric lifted back in to correct position prior to set of concrete. (THE TESTING AGENCY SHALL BE PRESENT DURING THE PLACEMENT OF SLABS-ON-GRADE, WHICH USE WELDED WIRE FABRIC OR REINFORCING STEEL BARS).
      5. Slabs-on-grade with fibrous reinforcement do not require this inspection.

3. Report inspection results in writing to the Architect and Contractor the same day that tests are made. Reports shall indicate the specific structural items inspected and the location, with column grid references, where possible to clearly identify the inspected items.
4. Additional Inspections: Where inspections indicate deficiencies and concrete placement is made prior the correction and retesting of these deficiencies or where concrete placement of any structural item is made without this required inspection, the testing laboratory shall conduct additional tests, including concrete coring, magnetic detection devices, sonic testing devices and other methods as required to verify the conformance of the reinforcing steel placement to the Contract Documents. The Contractor shall pay for such inspections conducted and other additional inspections as may be required when unacceptable or un-inspected reinforcing steel placement is verified.

G. CONCRETE TESTING

1. The Contractor for the Work of 03 30 00 – Cast-in-Place Concrete, shall cooperate and coordinate with the testing laboratory to perform field quality control testing during concrete work. Refer to applicable specification sections for concrete testing requirements for cast-in-place concrete testing requirements.
2. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete, as follows:
   a. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
   b. Slump: ASTM C143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.
   c. Air Content: ASTM C231, pressure method; one for every other concrete load at point of discharge or when the indication of change requires.
   d. Compression Test Specimens: ASTM C31, one set of 6 standard cylinders for each compressive strength test, unless otherwise directed.
      1. Cast and store 3 cylinders for laboratory cured test specimens and 3 field-cured test specimens as specified in ASTM C31.
   e. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below and when 80 degrees F. and above; and each time a set of compressive test specimens is made.
   f. Compressive Strength Tests: ASTM C39, one set for each 100 cu. yds. Or fraction thereof, of each mix design placed in a day or for each 5,000 sq. ft. of surface area placed; 2 specimens (one field cured and one lab cured) tested at 7 days, and 2 specimens (one field cured and one lab cured) tested at 28 days, and 2 specimens (one field cured and one lab cured) retained in reserve for later testing if required.
      1. When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing strength tests for a given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
      2. When the total quantity of a given mix design of concrete is less than 50 cu. yds., the strength tests may be waived by the Architect if, in his judgment, adequate evidence of satisfactory strength is provided.
      3. When the strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protection and curing the in-place concrete.
3. Report test results in writing to the Architect and ready-mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.

4. Additional Tests: The testing service will make additional tests of in-place concrete, as directed by the Architect, when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression test on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Contractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.
5. Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement which has slump of total air content outside the specified values.
   a. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type of class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.
   b. Strength test of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.
      1. Provide improved means and procedures for protecting concrete when the 28-day compressive strength of field-cured cylinders is less than 85 percent of companion laboratory cured cylinders.
      2. When laboratory cured cylinder strengths are appreciably higher then the minimum required compressive strength, field cured cylinder strength need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.
      3. If individual tests of laboratory cured specimen produce strengths more than 500 psi below the required minimum compressive strength or if tests of field cured cylinders indicates deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area n question may be required.
   c. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.
6. Deficient concrete shall be removed and replaced by the Contractor without additional cost to the Owner.

H. <u>CONCRETE MATERIALS AND MIX DESIGN</u>

1. Concrete Materials and Mix Design: The contractor(s) for Section 03 30 00 – Cast-In-Place Concrete shall provide the following in conformance with the requirements of Section 03 30 00 – Cast-In-Place concrete.
   a. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.
   b. Product Data: Submit 2 copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, water stops, joint systems, chemical floor hardeners and dry shake finish materials.
   c. Laboratory Test Reports: Submit 2 copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.
   d. Mix Design: Submit 6 copies of concrete mix designs for each type of mix required by the Concrete Schedule indicating the amount of each ingredient (by weight) in one cubic yard of concrete, the calculated water/cement ratio, and the slump.
2. Tests for Concrete Materials.
   a. For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.
   b. For lightweight concrete, test aggregates by the methods of sampling and testing of ASTM C330.

1. For Portland cement, sample the cement and determine the properties by the methods of test of ASTM C33.

c. Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates, materials manufacturer and brand name for manufactured materials values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

3. Submit signed statement from ready-mix plant that concrete furnished for the Project will exactly conform to the approved design mixes.

I. TESTS FOR FF/FL:

1. Refer to Section 03 30 00 – Cast-In-Place Concrete.

J. TESTS FOR MORTAR

1. The Contractor for the Work Section 04 20 00 – Masonry Units, shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Section 04 20 00 – Masonry Mortar, unless specifically noted otherwise.
2. For colored and non-colored mortars test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.
3. Provide a minimum of one set of cubes for testing per 5,000 sq. ft. of masonry wall construction and as directed by Architect.
4. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material and test results. Indicate whether or not material is acceptable for intended use.
5. If compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.
6. Deficient mortar shall be removed and replaced by the contractor without additional cost to the Owner.

K. TESTS FOR GROUT

1. The Contractor for the Work of Section 04 20 00 – Unit Masonry, shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Section 04 20 00, unless specifically noted otherwise.
2. Grout for filling reinforced or un-reinforced concrete masonry cores or brick cavities test for compressive strength by methods as described in Section 04 20 00.
   a. Provide a minimum of one set of 3 test specimens for testing per 5,000 square feet of masonry wall construction or for each ready mix truck load of grout and as directed by the Architect.
3. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, specific location where material represented by sample is used, slump and compression test results. Indicate whether or not material is acceptable for intended use.
4. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.
5. Deficient grout shall be removed by the Contractor without additional cost to the Owner.

L. TESTS OF CONCRETE MASONRY PRISMS

1. The Contractor for the Work of Section 04 20 00 – Unit Masonry, shall cooperate with a separate testing laboratory to perform field quality control testing during the masonry work under Section 04 20 00.

2. When required by the Masonry Plan, construct a set of 3 masonry prisms using mortar and concrete masonry units to be used in the masonry work. Unless otherwise noted, construct prisms 8 inches by 8 inches by 16 inches high (nominal) in compliance with ASTM E447, Method B.
3. When prism tests are required to establish the strength of masonry in lieu of Masonry Inspections, provide a minimum of one set of 3 masonry prisms for testing for each 5,000 sq. ft. (gross) of masonry wall construction.
4. Submit written reports for each prism tested. Provide the project identification name and number, date of report, name of Contractor, name of testing service, name of material suppliers, specific location where masonry represented by the prism is used, compressive test strength results and specified required strength.
5. If the compressive strength tests fail to meet6 the minimum strength specified in the Plans, the masonry represented by the tests shall be considered deficient.
6. When tests indicating deficient masonry represent masonry already constructed, such masonry shall be moved and replaced by the Contractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

M. MASONRY INSPECTION

1. Provide masonry construction inspection of concrete or brick masonry walls indicated as requiring inspection on the Masonry Plans to insure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths.
2. Qualification of Inspection Agency: Refer to Section 01 45 29 – Testing Laboratory Service. Individual inspector shall be certified as a masonry construction inspector by the National Concrete Masonry Association or by a qualified state Masonry Institute or Association.
3. Inspection shall use NCMA-TEK 18-3 Quality Assurance as a guideline.
4. The individual or individuals who will perform the masonry inspection shall be present for the Pre-masonry Conference.
5. The masonry inspector shall prepare a written report or reports for each day of inspection.
6. The masonry inspector shall be present and observe all masonry construction operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

N. WELDING QUALITY CONTROL

1. Refer to Structural Drawings and Section 05 12 00 for structural steel testing requirements.
2. Welding operators shall be qualified under the provisions of the AWS Structural Welding Code on test pieces in positions and with clearances equivalent to those actually to be encountered in construction. Welders shall make only those types of welds for which they are specifically certified.
3. Welds requiring inspection shall be so indicated in the Drawings.
   a. Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect, pre-qualified to make the weld being inspected. Welders and inspectors shall be pre-qualified by the American Welding Society Qualifications Test.
4. The Contractor performing the welding requiring visual inspection shall coordinate with an independent testing service, acceptable to Architect to perform weld testing.
5. Submit written reports for each weld tested. Provide project identification and number, date of report, name of Welding Contractor, name of testing service, location of weld type of weld, and test results.

Indicate whether or not weld is acceptable for intended use. Written reports shall be submitted for each weld tested and shall indicate whether or not weld is acceptable for intended use.

6. If by inspection welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced.

O. BOLTED STRUCTURAL CONNECTIONS QUALITY CONTROL

1. The Contractor to the Work of Section 05 12 00 – Structural Steel, shall cooperate with a separate testing laboratory, to perform field quality control inspection of slip-critical and snug-tight bolted connections.
2. Inspection of slip-critical connections shall be visual. The inspector shall be present at the beginning of steel erection to insure that the erector is conforming to the Contract Documents and AISC Specifications. The inspector shall verify that the erector is marking the bolts and nuts prior to the turn-of-nut procedure. Ten percent of all slip-critical bolted connections shall be observed as they are installed. Any connections which, in the opinion of the inspector, do not meet the tightening requirements of the Contract Documents shall be corrected by the erector.
   a. Inspection of snug-tight connections shall be made by use of a spud wrench. Ten percent of all snug-tight bolted connections selected randomly over the entire limits of the building structure shall be tested to verify tightness. If more than 20 percent of the bolts tested do not meet the General Requirements of the Contract Documents, the erector shall be required to retighten all snug-tight bolted connections on the Project.

P. STRUCTURAL STEEL ALIGNMENT QUALITY CONTROL

1. The Contractor for the Work of Section 05 12 00 – Structural Steel, shall cooperate with the separate testing laboratory, to perform field measurement of structural steel beams, columns, joist and deck alignment.
2. Alignment shall be measured and compared to AISC "Code of Standard Practice for Steel Buildings and Bridges".
3. The Testing Agency shall submit, to the Architect, a written report summarizing the measurements performed and the equipment used in the fieldwork. Where alignment fails to meet AISC requirements, the Contractor for the work in Section 05 12 00 shall make the required correction.

Q. COLD-FORMED METAL FRAMING QUALITY CONTROL

1. The Contractor for the Work of Section 05 40 00 – Cold-Formed Metal Framing, shall cooperate with the separate testing laboratory, to perform field inspections of the cold-formed metal framing and light gauge steel trusses installed on this project.
2. Refer to Specification Section 05 40 00 for testing requirements. Testing, in general shall consist of visual inspections for connections consisting of: truss-to-truss, truss-to-base (masonry walls), truss-to-structural steel, etc.; and, connections of structural cold-formed framing of exterior wall systems.
3. Testing may also include destructive testing of the connections for analysis of anchoring loads, as well as any weld connections.
4. The Testing Agency shall submit, to the Architect, a written report summarizing the inspections performed and the equipment used in the field work. Where failures occur in the connections, the Contractor for the work in Section 05 40 00 shall make the required correction(s).

R. THERMAL SCAN

1. Owner reserves the right to obtain, at its sole expense, an independent thermal scan of the building during the first winter season following occupancy of the Project. The agency retained by the Owner will perform a sufficient number of infrared scans of the interior and exterior of the building envelope to evaluate the following:

a. Any portions of the building envelope with excessive heat loss.
b. Any portion of the building envelope with excessive infiltration or exfiltration and their sources.
c. Any portions of the building with abnormally low insulation values.

2. Thermo grams of all problem areas will be provided for comparison with color real life photo grams. All work will be recorded on video.
3. Breaks and/or voids in the specified insulation systems may be considered defective and or non-conforming work. In such case, the Contractor may be required to remedy the condition(s) without additional compensation.

S. REPAIR AND PROTECTION

1. General: Upon completion of inspection, testing, sample-taking, and similar services performed on Work, repair damaged Work and restore substrates and finishes to eliminate deficiencies including defects in visual qualities of exposed finishes. Except as otherwise indicated, comply with requirements of Contract Documents for "Cutting and Patching." Protect Work exposed by or for service activities and project repaired Work. Repair and protection is Contractor's responsibility for inspection, testing or similar service.

END OF SECTION 01 45 00

SECTION 01 45 29 – TESTING LABORATORY SERVICE

A. SUMMARY

1. The Owner, through the Architect, may employ and pay for services of an independent testing laboratory to perform specified inspection, testing and sampling for concrete and masonry services. Testing shall be at the direction of the Owner or Architect, as required.
2. Inspections and testing required by laws, ordinances, rules, regulations, or orders of public authorities and General Conditions and applicable Sections of the technical specifications.
3. Inspection, sampling and testing of concrete: As required by applicable specification Sections.

B. QUALIFICATIONS OF LABORATORY AND SUBMITTALS

1. Met requirements of ASTM E329, current edition "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction."
2. All testing and inspection performed by the testing laboratory shall be under the direct supervision of a professional engineer licensed in the state of the construction activities.

C. LABORATORY DUTIES, LIMITATIONS OF AUTHORITY

1. Provide qualified personnel promptly on notice.
2. Perform specified inspections, sampling, and testing or materials and methods of construction.
   a. Comply with specified standards; ASTM, other recognized authorities and as specified.
   b. Ascertain compliance with requirements of Contract Documents.
3. Promptly notify the Architect and Contractor of irregularities in the Work to be performed with the Documents and Deficiencies of Work performed which are observed during performance of services.
4. Laboratory is not authorized to:
   a. Release, revoke, alter, or enlarge on requirements of Contract Documents.
   b. Approve or accept portion of Work.
   c. Perform duties of the Contractor.

D. CONTRACTOR'S RESPONSIBILITIES

1. Cooperate with laboratory personnel to provide access to Work and to manufacturer's operations.
2. Assist laboratory personnel in obtaining samples at the site.
3. Notify laboratory sufficiently in advance of operations to allow for his assignment of personnel and scheduling of tests.
4. Should the Contractors fail to schedule laboratory services or fail to cancel laboratory services, if the need arises, all additional cost shall be borne by the Contractors.
5. Employ, and pay for, services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling, and testing required when initial tests indicate work does not comply with Contract Documents.
   a. The Architect and Owner shall approve the separate laboratory.

END OF SECTION 01 45 29

SECTION 01 51 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

A. GENERAL REQUIREMENTS

1. Furnish labor materials, tools, equipment, and services for temporary facilities, including maintenance and their subsequent removal, in accordance with provisions of the Contract Documents and as required for the progress and completion of the Project.
2. Any Contractor requiring one of the temporary services before it can be provided as specified, or whose requirements with respect to a particular service differ from the service specified, shall provide such services as suits his needs at his own expense and in a manner satisfactory to the Architect.
3. Pay applicable costs unless specifically stated otherwise. Each Contractor to obtain and pay for all required permits and inspections for temporary services included under its Contract.
4. Coordinate temporary facilities work with other trades and the Owner/Architect. The responsible Contractor doing the Work, if the temporary work has not been coordinated with the other trades, shall pay rerouting or relocation expenses.
5. Repair, as required, Work that has been interfered with or damaged as a result of temporary facilities work, including holes in walls and/or floors from temporary partition anchorage. Pay for repair any damage to roofing resulting from installation of temporary protection.
6. Provide and maintain temporary facilities in compliance with governing rules, regulations, codes, ordinances and laws of municipalities, agencies and utilities having jurisdiction over work involved in the Project.

B. TEMPORARY ELECTRIC AND LIGHTING

1. Existing power receptacles and lighting are available within the vicinity of the Work.
2. The Contractor will be held responsible for reasonable and customary practices for the conservation of electrical energy.
3. Supplemental Temporary Lighting: Electrical Contractor shall provide temporary lighting to sustain a minimum level of 100-watt lamp for every 100 SF of floor area. The lighting shall be installed as soon as possible. The furnishing of all lamps, lamp guards and maintenance of the lighting will be by the Electrical Contractor. Suspend wiring as required to keep bottom of fixtures at approximately 10’-0” above floor. As interior partitions are constructed, Electrical Contractor to revise temporary lighting so that specified lighting level is provided in each room or space, including custodial areas and pipe chases. If temporary wiring interferes with construction, the removal and relocation of the wiring as required to avoid any interference will be provided by the Electrical Contractor at no additional cost to the Trade Contractor requiring relocation, or Owner.
   a. Any temporary lighting or electrical service required beyond that specified above shall be provided by the party requiring the same at no additional cost to the Owner.
   b. Each contractor or subcontractor to provide its own extension cords and necessary related items.
   c. Electrical work constructed in connection with temporary service specified herein to conform with Federal safety requirements, Ohio Safety Code IC-3 and requirements of the National Electric Code as interpreted by the inspecting authority. Electrical Contractor to obtain and pay for required applications, permits and inspections pertaining to this work, and such costs shall be included in Electrical Contractors Base Bid proposal.
   d. Temporary wiring is to be laid out, balanced and sized so as to produce a voltage drop of no more than five percent at extreme end of line when operation at full load.
4. Temporary wiring, fittings and devices are not to be used for permanent installations, but remain the property of the Contractor and are to be removed as soon as permitted by installation of permanent systems.

C. TEMPORARY WATER SERVICE

1. Temporary water service connection shall be made available on-site.

2. Contractors or Subcontractors requiring water to provide adequate hoses and fittings as required to meet their own needs.
3. Owner will pay for all water consumed during construction period.

D. TEMPORARY TOILETS

1. General Contractor shall be responsible for providing and maintaining temporary chemical toilet facility, to be used by work persons. Quantity of Units shall be per OSHA recommendations for total workforce. Location of the toilet shall be determined at pre-construction coordination meeting.
   a. No toilet fixtures, drains, or other connections shall be used for the disposal of building refuse or waste materials.

E. DEWATERING

1. Should Contractor, in dewatering operations, notice excessive infiltration of ground water into pumped out area, Contractor shall notify Architect before continuing dewatering, otherwise Contractor shall be responsible for excessive dewatering and resulting damage to stability of foundations.
2. All water shall be removed prior to placement of concrete or laying of pipe, conduit, equipment, or any materials.
3. Each Contractor is responsible for any necessary or required pumping and dewatering required to complete or carry on its Work.
4. Contractors shall also be responsible for protection of foundation excavations, trenches and completed Work from rain, ground water or other flooding. Provide and operate sufficient pumping equipment to maintain excavations and other construction areas free of standing water. Water shall be pumped into storm drainage system and shall not be allowed to run onto the ground areas.
5. Each Contractor shall take every necessary precaution, including but not limited to, cleanup, to prevent floor and roof drains, being responsible for the costs of related damages.

F. PROTECTION OF INSTALLED WORK

1. Each Contractor and his subcontractor shall provide adequate protection of their related work and necessary repairs prior to Owner acceptance. See also section 01 60 00.
2. Protect installed Work and provide protection where specified in individual specification Sections.
3. Provide temporary and removable protection for installed Products.

G. ACCESS TO CONSTRUCTION OPERATIONS, TEMPORARY ROADS AND PARKING

1. All Contractors performing outside work must provide means to remove mud from vehicles before they enter street. Also means to clean street if required. Existing paved areas may be used under responsibility of Contractor which intends to use existing area only if such paved areas are adequate for weight of construction equipment. Any damage to paved area shall be repaired by Contractor.
2. Each contractor will be responsible to keep public roads adjacent to project site free of mud, debris and other foreign materials resulting from all project construction and vehicular traffic leaving site, to the satisfaction of governing public authorities regulating such conditions.
3. Do not interfere with normal use of roads in vicinity of Project site except as indicated or as absolutely necessary to execute required work, and then only after arrangements have been made with authorities having jurisdiction, including traffic control as applicable.
4. General Contractor shall maintain all construction entrances.
5. Each Contractor shall perform the installation and maintenance of all temporary, around site, access roads or ramps needed for work under their contract. Access to the building or around the building shall also be the responsibility of the Contractor requiring such.

H. FIRE SUPPRESSION

1. Fire suppression shall conform to OSHA, NFPA, and OBBC temporary suppression.
2. Absolutely NO open fires on site.

I. FIELD OFFICES

1. Each Contractor will be responsible to furnish trailers, if required, to perform their contracted work.
   a. As project site space allows and as approved by the Architect, each contractor may provide a secure office of sufficient size and facilities to accommodate his field personnel and storage.
   b. Costs associated with contractor's field office are the sole responsibility of each contractor providing an office.

J. MATERIALS STORAGE

1. Each Contractor shall manage location, size and sequencing of all material storage areas on site. It is highly recommended that each Contractor shall provide supplemental off site storage as required by progress of work.
2. Each Contractor and subcontractor shall provide adequate storage facilities for protection of materials and equipment they furnish. Materials and equipment shall be stored so as to ensure preservation of their quality and fitness of work. Perishable items and items affected by weather, rain, wind, dust, heat or cold shall be stored in temporary waterproof sheds or trailers with raised floors, and heated if necessary. Other materials and equipment shall be stored on platforms and not on ground.
3. Temporary storage of materials at the site shall not interfere with the work of other contractors. If necessary, stored materials shall be relocated or removed from the site.

K. BARRICADES

1. All Contractors shall provide perimeter type barricades encircling or containing various construction-excavated areas. Contractor for work requiring a barricade shall bear all cost associated with exterior barricades and night warning lights.
2. General Contractor shall provide, maintain and remove fall protection barricades, for general purpose areas to include, but not limited to stair openings, duct openings, interior shafts and elevator shaft openings.
3. Barricades:
   a. 48" above ground level (horizontal members) and of standard length and construction.
   b. Both sides of horizontal member shall be provided with alternate diagonal (45 degree) orange and white stripes, 6" wide.
   c. Striping shall be reflective material, paint, or tape which will glow under artificial light.
   d. Type of barricading (i.e., perimeter or line) required will be determined by size, location, or shape of areas removed or under construction.
   e. All barricades and warning lights must meet local, state, and federal requirements for safety and hazard control. Obtain all permits and/or approvals prior to placement.
4. Night Warning Lights;
   a. Battery operated, neon type, flashing lights, with 360-degree visibility and amber in color.
   b. Night warning lights shall be securely bolted or locked in upright position to barricade.
   c. Maximum spacing of night warning lights shall be 30'-0" on center for work areas.
   d. Other barricaded hazardous areas shall have minimum of 2 each night warning lights, or more, if so directed by Owner's Representative to insure safety.
5. Preparation – Furnish, place, and maintain barricades and night danger lights as herein specified and as directed by Architect.
6. Call and notify Architect at least 72 hours prior to placing barricades or starting any work whereby traffic will be impended or hindered, especially fire trucks, police vehicles, and City Highway Department Vehicles.

7. Obtain prior approval of local authorities when work operations will result in street closures. When streets are approved for closure, establish and mark safe detours for vehicles to follow.

L. TRASH DUMPSTERS

1. General Contractor shall be responsible for arrangements and associated costs for trash dumpsters. Contractors are encouraged to coordinate and consolidate trash dumpsters.

END OF SECTION 01 51 00

SECTION 01 60 00 – PRODUCT REQUIREMENTS

A. SUMMARY

1. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.
   a. Product standards and quality.
   b. Manufacturer's directions.
   c. Warranties.
   d. Material delivery and responsibilities.
   e. Protection.
   f. Acceptance of equipment or systems.
2. It is the intent of the Contract Documents to accomplish a complete and first-grade installation in which there shall be installed new materials and products of the latest and best design and manufacturer. Workmanship shall be thoroughly first-class and complete, executed by competent and experienced workmen.
3. Equipment, specialties, and similar items shall be checked for compliance and fully approved prior to installation. Contractors are cautioned that work or equipment installed without approval is subject to condemnation, removal, and subsequent replacement with an approved item without extra cost to Owner.

B. DEFINITIONS

1. Definitions used in this Article are not intended to change the meaning of other terms use in the Contract Documents, such as "specialties," "system," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.
   a. "Products" are items purchased for incorporation in the Work, whether purchased for the project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   b. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the Work.
3. "Equipments" is a product with operational parts, whether motorized or manually operated, that require service connections, such as wiring or piping.

C. QUALITY ASSURANCE

1. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
2. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
   a. Each prime contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate contractors.

D. PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
   a. Schedule delivery to minimize long term storage at the site and to prevent over crowding of construction spaces.
   b. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged or sensitive to deterioration, theft and other losses.

c. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
d. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
e. Store products off the site in a manner that will facilitate inspection and measurement of quality or counting of units.
f. Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.
g. Store products subject to damage by elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

E. PRODUCT STANDARDS AND QUALITY

1. The Contract is based on the materials, equipment and methods described in the Contract Documents.
2. Where in the Drawings and Specifications certain products, manufacturer's trade names, or catalog numbers are given, it is done for the expressed purpose of establishing a basis of quality, durability, and efficiency of design for the work outlined and is not intended for the purpose of limiting competition.
3. The Architect will consider proposals for substitution of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data and all other information required by the Architect to evaluate the proposed substitution. Such proposals need to be submitted at least ten (10) days prior to the scheduled date for receipt of bids.
4. Do not substitute materials, equipment or methods unless such substitution has been specifically approved for this Work by the Architect as evidenced by the incorporation of such materials, equipment or methods into the Contract Documents by written Addendum.
5. "Or equal":
   a. Where the phrase "or equal" or "or equal as approved by the Architect" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the Architect unless the item has been specifically approved via submittal process.
6. Availability of Specified Items:
   a. Verify prior to bidding that specified items will be available in time for installation during orderly and timely progress of the Work.
   b. In the event specified item or items will not be so available, notify the Architect prior to bidding.
   c. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will be back charged as necessary and shall not be borne by the Owner.
7. The Architect reserves the right to refuse approval of substituted products proposed for those specified, if in his opinion the item to be substituted will not achieve the finished effect, appearance or performance desired, as portrayed in the Drawings and Specifications. The Architect's said refusal to approve, established by this paragraph, is final and not subject to arbitration.

F. MANUFACTURER'S DIRECTIONS

1. Products shall be applied, installed, erected, used, and cleaned in accordance with the manufacturer's printed direction, unless herein specified to the contrary. Where manufacturer's printed directions are available and where reference is made to manufacturer's directions in the contract documents, the Contractor shall submit copies of such directions to the Architect prior to the beginning of Work covered thereby.
2. Where specific installation instructions are not part of these Specifications and Drawings, equipment shall be installed in strict accordance with instructions from the respective manufacturers. Where installation instructions included in these Specifications or Drawings are at a variance with instructions

furnished by the equipment manufacturer, the Contractor shall make written request for clarification from the Architect.

3. In accepting or assenting to the use of apparatus or material, or make, or arrangement thereof, the Architect in no way waives the requirements of these Specifications or the warranty embodied therein.

G. WARRANTIES

1. Specific warranties called for in the Contract Documents, in addition to that falling under the general warranty as set forth in General Conditions, shall be furnished in accordance with the requirements of the Specifications.
   a. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
   b. Owner's Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
      1. Rejection of Warranties: The owner reserves the right to reject warranties and to limit selection to products with warranties not to conflict with requirements of the Contract Documents.
2. Each Contractor shall and does hereby agree to warrant for a period of one year, or for longer periods, where so provided in the Specifications, as evidenced by the date of Substantial Completion issued by the Architect, products installed under the Contract to be of good quality in every respect and to remain so for periods described herein.
3. Should defects develop in the Work within the specified periods, due to faults in products or their workmanship, the Contractor hereby agrees to make repairs and do necessary Work to correct defective Work to the Architect's satisfaction, in accordance with the General and Supplementary Conditions. Such repairs and corrective Work, including costs of making good other Work damaged by or otherwise affected by making repairs or corrective Work, shall be done without cost to the Owner and at the entire cost and expense of the Contractor within 14 days after written notice to the Contractor by the Owner.
   a. Related Damages and Losses: When correcting failed or damaged warranted construction, removed and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
   b. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
4. Where service on products is required under this Article, it shall be promptly provided when notified by the Owner and no additional charge shall be made, unless it can be established that the defect or malfunctioning was caused by abuse or accidental damage not to be expected under conditions or ordinary wear and tear.
5. The manufacturer and supplier expressly warrants that each item of equipment furnished by him and installed in this Project is suitable for the application shown and specified in the Contract Documents and includes features, accessories and performing characteristics listed in the manufacturer's catalog in force on the date bids are requested for the Work. This warranty is intended as an assurance by the manufacturer that his equipment is not being misapplied and is fit and sufficient for the services intended. This warranty is in addition to and not in limitation of other warranties or remedies required by law or by the contract Documents. It shall be the responsibility of the contractor for the particular equipment to obtain this warranty in writing.
6. In case the Contractor fails to do Work so ordered, the Owner may have work done and charge the cost thereof against monies retained as provided for in the Agreement and, if said retained monies shall be

insufficient to pay such cost or if no money is available, the Contractor and his Sureties shall agree to pay to the Owner the cost of such work.

H. MATERIAL DELIVERY AND RESPONSIBILITIES

1. Each Contractor shall be responsible for materials he orders for delivery to the jobsite. Responsibility includes, but is not limited to, receiving, unloading, storing, protecting and setting in place; ready for final connections.
2. Contractors shall insure that products are delivered to the Project in accordance with the Master Construction Schedule of the Project. In determining data of delivery, sufficient time shall be allowed for shop drawings and sample approvals, including the possibility of having to resubmit improperly prepared submittals or products other than those specified and the necessary fabrication or procurement time along with the delivery method and distance involved.

I. PROTECTION

1. Each Contractor shall protect building elements and products when subject to damage. Should workmen or other persons employed by one Contractor be responsible for damage, the entire cost of repairing said damage shall be assumed by said individual contractor. Should damage be done by a person or persons not employed by a Contractor, the respective Contractors shall make repairs.
2. Each Contractor shall protect their products prior to installation and final acceptance. Storage shall be dry, clean and safe. Materials or equipment damaged, deteriorated, rusted or defaced due to improper storage, shall be repaired, refined or replaced, as required by the Architect. Products lost through theft or mishandling shall be replaced by the Contractor without cost to the Owner.

J. ACCEPTANCE OF EQUIPMENT OR SYSTEMS

1. The Owner will not accept the start of the warranty period on systems or equipment until Substantial completion is issued to the respective Contractor(s) for Owner's occupancy of the building, in part or whole. Each Contractor shall make sure provisions as required to extend the manufacturer's warranty from time of initial operation of systems or equipment until Substantial Completion is given in writing.

END OF SECTION 01 60 00

SECTION 01 71 23 – FIELD ENGINEERING

A. SUMMARY

1. Section specifies administrative and procedural requirements for field engineering services including, but not limited to, the following:
   a. Land survey work.
   b. Anchor bolt layout survey.
   c. Civil engineering services.

B. SUBMITTALS

1. Certificates: Submit a certificate signed by the land surveyor, certifying the location and elevation of improvements comply with the Contract Documents.

C. QUALITY ASSURANCE

1. Surveyor Qualifications: Engage a land surveyor registered in the State where the project is located, to perform required land surveying services.

D. EXAMINATION

1. Contractors to verify layout information shown on the Drawings, in relation to the control points on the property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
   a. Should a benchmark or control point be lost, only the Land Surveyor or Professional Engineer shall establish new benchmarks or control points.
2. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction.
   a. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.

E. PERFORMANCE

1. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
   a. As construction proceeds, check every major element for line, level, and plumb.
2. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.
   a. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On project record drawings, record deviations that are accepted and not corrected.
3. Site Improvements: Locate and lay out site improvements, stakes for grading, fill and utility slopes, and invert elevations.
4. Anchor Bolt Survey Layout: On completion of anchor bolt installation and prior to erecting steel, prepare a certified survey showing dimensions, locations, angles and elevation of anchor bolts.
5. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, columns grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.
   a. Establish benchmarks at each floor level giving the exact level at the floor or floors, in the event there is more than one level required, as the Work progresses.

b. Establish benchmarks at each floor level accurate major lines sufficient for mechanical, electrical and other trades to properly locate their Work. Maintain lines until walls and other physical elements are defined. Contractors are responsible for the accuracy of the layout of their Work from the major lines and grades established. Each Contractor shall review and accept conditions installed by other Contractors prior to beginning their installation.

6. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

END OF SECTION 01 71 23

SECTION 01 74 23 – CONSTRUCTION CLEANING

A. SUMMARY

1. The Contractor is responsible for cleaning his own Work and the work of their subcontractors.
2. Related Work Specified Elsewhere.
   a. Section 01 78 00 – Closeout Procedures.
   b. Special cleaning requirements for specific construction elements are included in appropriate sections of Divisions 2 through 32.

B. DAILY CLEANING

1. Define and emphasize the responsibility of each Contractor to remove his rubbish and debris from the construction site to guard against fire and safety hazards as well as to provide a more efficient construction operation for all Contractors.
2. Each Contractor and Subcontractor, at the end of each working day, shall collect and remove all waste materials and debris pertaining to its work. General Contractor, shall be responsible for all costs associated with dumpster fees. All Contractors and/or Subcontractors working on the Project site are encouraged to coordinate and consolidate dumpster orders. At no time shall rubbish be allowed to accumulate or cause a fire hazard, either within the building or on site.
3. If any Contractor or Subcontractor fails to remove rubbish and/or debris pertaining to its Work, the Owner will authorize and direct removal of the rubbish and/or debris. Cost of removal will be charged to delinquent Contractor at hourly cost plus fringe benefits, overhead and profit.

C. ROUTINE CLEANING

1. Near the end of each work week, and more often if necessary, he General Contractor shall perform an overall clean up of the entire site, including a broom cleaning of appropriate surfaces. The trades shall remove their rubbish and debris from the building site to the rubbish collection location promptly upon its accumulation.

D. RUBBISH CONTAINMENT

1. Refer to Section 01 51 00 – Temporary Facilities and Controls for requirements.

E. SAFETY REQUIREMENTS

1. Hazards Control
   a. Store volatile wastes in covered metal containers, and remove from premises daily.
   b. Prevent accumulation of wastes which create hazardous conditions.
   c. Provide adequate ventilation during use of volatile or noxious substances.
2. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
   a. Do not burn or bury rubbish and waste materials on project site.
   b. Do not dispose of volatile wastes in storm or sanitary drains, streams or waterways.

F. MATERIALS

1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
   a. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finish surface.

G. FINAL CLEANING

1. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

2. Each Contractor shall perform his respective final clean up and shall leave the Work of the completed Project in clean, neat condition.
3. The following are examples, but not by way of limitation, of cleaning levels required:
   a. Remove labels which are not required as permanent labels.
   b. Clean transparent materials, including mirrors and window/door glass to a polished condition, removing substances which are noticeable as vision-obscuring materials. Replace broken glass and damaged transparent materials.
   c. Clean exposed exterior and interior hard-surfaced finishes, to a dirt-free condition, free of dust, stains, films, and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
   d. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.
   e. Remove debris and surface dust from limited-access spaces including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
   f. Clean concrete floors in unoccupied spaces broom clean.
   g. Vacuum clean carpeted surfaces and similar soft surfaces.
   h. Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure.
   i. Clean light fixtures and lamps so as to function with full efficiency.
   j. Clean project site (yard and grounds), including landscape development areas of litter and foreign substances. Sweep paved areas to a broom-clean condition; remove stains, petrol-chemical spills, and other foreign deposits. Rake grounds, which are neither planted nor paved, to a smooth, even textured surface.
   k. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even textured surface.
   l. Remove petrochemical spills, stains and other foreign deposits.
   m. Remove tools, construction equipment, machinery and surplus material from the site.
4. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.
5. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

END OF SECTION 01 74 23

SECTION 01 78 00 – CLOSEOUT PROCEDURES

A. RELATED DOCUMENTS

1. The Work of this Section shall be included as a part of the Contract Documents of each Contractor on this Project. Where such Work applies to only one Contractor, it shall be defined as to which Contractor the Work belongs.
2. Refer to the General and Supplementary Conditions of the Contract for Substantial Completion and final payment.

B. SUMMARY

1. Closeout is hereby defined to include general requirements near end of Contract Time. In preparation for final acceptance, final payment, normal termination of contract, occupancy by Owner, and similar actions evidencing completion of the Work. Specific requirements for individual units of Work are specified in Sections of Division 2 through 28. Time of closeout is directly related to "Substantial Completion."
2. This Section includes administrative and procedural requirements for contract closeout including, but not limited to, the following:
   a. Prerequisites to substantial completion.
   b. Prerequisites to final payment.
   c. Project record documents.
   d. Certification of code compliance.
   e. Operation and maintenance manuals.
   f. Instruction of Owner's personnel.

C. PREREQUISITIES TO SUBSTANTIAL COMPLETION

1. General: Prior to requesting Architect/Engineer inspection for certification Substantial Completion (for either Work of portions thereof), complete the following and list known exceptions in request.
   a. In the Application for Payment that coincides with, or first follows, the date of Substantial Completion is claimed, show 100 percent completion for the Work claimed as substantially complete.
      1. Include supporting documents for completion as indicated in those Contract Documents and a statement showing an accounting for changes to the Contract Sum.
      2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not compete.
   b. Advise Owner of pending insurance changeover requirements.
   c. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, agreements, final certifications and similar documents.
   d. Obtain and submit releases enabling Owner's full and unrestricted use of the Work and access to services and utilities, including occupancy permits, operating certificate and similar releases.
   e. Submit record drawings, maintenance manuals, damage or settlement surveys, property survey and similar final record information.
   f. Delivery tools, spare parts, extra stocks of materials and similar physical items to Owner.
   g. Make final changeover of locks and transmit keys to Owner and advise Owner's personnel of changeover in security provisions.
   h. Complete start-up testing of systems and instructions of Owner's operating/maintenance personnel. Discontinue and remove from project site temporary facilities and services, along with construction tools, mock-ups and similar elements.
   i. Complete final cleaning-up requirements. Refer to Section 01 74 23 – Construction Cleaning.
   j. Touch up and otherwise repair and restore marred, exposed finishes.
2. Inspection Procedures: On receipt of a request for inspection, the Architect will either proceed with inspection or advice the Contractor of unfilled requirements. The Architect will prepare the Certificate of

Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

a. The Architect will repeat inspection when requested and assured that the Work is substantially complete.
b. Results of the complete inspection will form the basis of requirements for final acceptance.

D. PREREQUISITES TO FINAL PAYMENT

1. General: Prior to requesting Architect/Engineer final inspection for certification of final payment, complete the following:
   a. Refer to General Conditions.
   b. Submit an updated final statement, accounting for final additional changes to the Contact Sum.
   c. Submit final payment request, with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and complete operations where required.
   d. Submit copy of Architect/Engineer final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.
   e. Submit record drawings, maintenance manuals, and similar final record information.
   f. Certification of code compliance.
   g. Submit certification stating that no materials containing asbestos were incorporated into the Work.
   h. Plumbing Contractor shall submit certification stating no flux or solder used for drinking water piping contained more than 0.2 percent lead, and that no pipe or fittings used for drinking water piping contained more than 8.0 percent lead.
   i. Fire stopping Contractor's letter of certification stating that all fire stopping systems have been installed in accordance with the Contract Documents.
   j. Submit final meter readings for contractor paid utilities, and similar data as for the date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of the work.
   k. Submit consent of surety to final payment.
   l. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   m. Submit a final liquidated damages settlement statement.
2. Re-inspection Procedure: The Architect will re-inspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to the Architect.
   a. Upon completion of re-inspection, the Architect will prepare a certificate of final acceptance. If the Work is incomplete, the Architect will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

E. PROJECT RECORD DOCUMENTS

1. Project Record Documents include, drawings, project manual, product data and samples.
2. Each Contractor shall update "Project Record Drawings" on separate line prints set-aside especially for this purpose on the job. Drawings shall incorporate changes made in the Work of the respective trades during the construction period. Such change shall be indicated at the time they occur.
3. Each of these project record drawings shall be clearly marked "Project Record Documents", maintained in good condition; available for observation by the Architect. Mark these drawings to show the actual installation where the installation varies from the installation shown originally. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later. Items required to be marked include, but are not limited to, the following:
   a. Significant changes and selections made during the construction process.
   b. Dimensional changes to the Drawings.
   c. Significant detail not shown in the original Contract documents including Change Orders or Construction Change Directives.

d. The location of underground utilities and appurtenances dimensionally referenced to permanent surface improvements.
e. The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structures.
f. Revisions to details shown on the Drawings.
g. Depths of foundations below the first floor.
h. Revisions to routing of piping and conduits.
i. Revisions to electrical circuiting.
j. Actual equipment locations.
k. Duct size and routing.
l. Changes made following the Architect's written orders.
m. Details not on original Contract Drawings.
n. Charts and locations of concealed work.
    1. The Plumbing and HVAC Contractors shall prepare a suitable chart identifying and locating each concealed control or other concealed item requiring repair, adjustment, and maintenance.
    2. Charts shall list each item, together with its function, item number and location.
    3. Locations throughout the building shall be identified on the wall or ceiling by permanent, non-obstructive plates, labels or other approved means secured in a permanent manner.

4. Keep project record documents current. Do not permanently conceal work until the required information has been recorded. Mark record prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where shop drawings are marked, show cross-reference on Contract Drawings location.
    a. Mark record sets with color that may be photo copied.
    b. Note Construction Change Directive number, alternate numbers, change order numbers and similar identification.
5. During the construction period, maintain one copy of the Project Manual, including addenda and modifications issued, for Project Record Documents purposes.
    a. Mark the Specifications to indicate the actual installation where the installation varies from that indicated in Specifications and modifications issued. Note related project record drawings information, where applicable. Give particular attention to substitutions, section of product options, and information on concealed installations that would be difficult to identify or measure and record later.
6. During the construction period, maintain 3 copies of each product data submittal for Project Record Document purposes.
    a. Mark product data to indicate the actual product installation where the installation varies substantially from the indicated in project data submitted. Include significant changes in product delivered to the site and changes in manufacturer's instruction and recommendations for installation.
    b. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
    c. Note related Change Orders and markup of record drawings, where applicable.
    d. Where record product data is required as a part of maintenance manuals, submit marked up product data as an insert in the manual instead of submittal as record product data.
7. Prior to final payment on the Project, submit to the Architect the "Project Record Documents" for changes recorded for the Work of Divisions 2 through 16.
    a. Each drawing shall be labeled "Project Record," dated, and signed by the Contractor(s).

F. <u>MAINTENANCE AND OPERATING MANUALS</u>

1. Operating instructions shall include necessary printed directions for correct operations, adjustment, servicing and maintenance of movable parts. Also included shall be suitable parts lists, approved shop

drawings, diagrams showing parts location and assembly, information specified in individual Specification Sections and the following:
   a. Emergency instructions.
   b. Copies of specific warranties.
   c. Wiring diagrams.
   d. Recommended maintenance procedures and turn around times.
   e. Inspection and system test procedures.
   f. Precautions against improper maintenance and exposure.
2. Prior to issuance of final payments, each Contractor shall submit 3 completed copies of maintenance manuals to the Architect.
3. Finished manuals shall be loose-leaf type with hardboard covers and titled tabs identifying each particular portion or item of the Work.
4. For each titled item or work portion, manual must provide the names, addresses, and phone numbers of the following parties:
   a. Contractor/installer.
   b. Manufacturer.
   c. Nearest dealer/supplier and agency capable of supplying parts and service.
5. For each manual label on front cover or spine shall indicate the following information:
   a. Project name and address.
   b. Owner's name.
   c. Name and address of Architect.
   d. Name and address of Contractor.
   e. Date of submission.

G. INSTRUCTION TO OWNER'S PERSONNEL
1. Arrange for each Installer of equipment that requires regular maintenance and noted in technical sections, to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if Installers are not experienced in operation and maintenance procedures. Include a detailed review of the following manuals.
   a. Maintenance manuals.
   b. Spare parts, materials or special tools.
   c. Lubricants.
   d. Fuels.
   e. Identification systems.
   f. Control sequences.
   g. Hazards.
   h. Cleaning.
   i. Warranties and maintenance agreements and similar continuing commitments.
2. As part of instruction for operating equipment, demonstrate the following procedures:
   a. Startup.
   b. Shutdown.
   c. Emergency operations.
   d. Noise and vibration adjustments.
   e. Safety procedures.
   f. Economy and efficiency adjustments.
   g. Effective energy utilization.

END OF SECTION 01 78 00

SECTION 02 41 19 – SELECTIVE DEMOLITION, CUTTING AND PATCHING

A. SUMMARY OF WORK

1. Requirements and limitations for selective demolition, cutting and patching of work.

B. RELATED SECTIONS

1. Section 01 01 00 – Summary of Work
2. Section 01 33 00 – Submittals.
3. Section 01 60 00 – Product Requirements: Product Options and Substitutions.
4. Individual Product Specification Sections:
   a. Selective demolition, cutting and patching incidental to work of the Section.
   b. Advance notification to other Sections of openings required in work of those Sections.
   c. Limitations on cutting structural members.

C. SUBMITTALS

1. Submit written request in advance of patching or alteration which affects:
   a. Structural integrity of any element of Project.
   b. Integrity of weather-exposed or moisture-resistant element.
   c. Efficiency, maintenance, or safety of any operational element.
   d. Visual qualities of sight-exposed elements.
2. Include in request:
   a. Identification of Project.
   b. Location and description of affected work.
   c. Description of proposed work, and products to be used.
   d. Alternatives to patching.
   e. Effect on work of Owner or separate contractor.
   f. Written permission of affected separate contractor.
   g. Date and time work will be executed.

D. MATERIALS

1. Primary Products: Those required for original installation.
2. Product Substitution: For any proposed change in materials, submit request for substitution under provision of Section 01 60 00.

E. EXECUTION

1. Inspect existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching.
2. After uncovering existing work, inspect conditions affecting performance of work.
3. Beginning of cutting or patching means acceptance of existing conditions.

F. PREPARATION

1. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

G. SELECTIVE DEMOLITION

1. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete work within limitations of governing regulations and as follows:
   a. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition work above each floor or tier before disturbing supporting members at lower levels.

b. Neatly cut openings and holes plumb, square and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering or chopping. Temporarily cover openings to remain.
c. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
d. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct or pipe interiors, verify condition and content of hidden space before starting flame-cutting operations. Maintain portable fire extinguishing devices during flame cutting operations.
e. Maintain adequate ventilation when using cutting torches.
f. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off site.
g. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact and dust generation.
h. Locate selective demolition equipment throughout the structure and remove debris and materials so as not to impose excessive loads on supporting walls, floors or framing.
i. Dispose of demolished items and materials promptly. In-site storage or sale of removed items is prohibited.
j. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

2. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power driven masonry saw or hand tools; do not use power driven impact tools.

H. CUTTING AND PATCHING

1. Execute cutting, fitting, and patching including excavation and fill to complete work.
2. Fit products together, to integrate with other work.
3. Structural Work:
   a. Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio. Submit proposal and request and obtain Architect's approval before proceeding with cut-and-patch of structural work.
4. Operational/Safety Limitations:
   a. Do not cut-and-patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance. Submit proposals and requests and obtain Architect's approvals before proceeding with cut-and-patch work.
5. Visual/Quality Limitations:
   a. Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of visual qualities and similar qualities, as judged by the Architect.

I. PERFORMANCE

1. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
2. Employ original installer/fabricator, or if not available, an acceptable equivalent entity, to perform patching for all cut-and-patch materials and site-exposed surfaces.
3. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
4. Restore work with new products in accordance with requirements of Contract Documents.
5. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
6. At penetrations of fire-rated walls, partitions, ceiling, or floor construction, completely seal voids with fire-rated material to full thickness of the penetrated element.

7. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

J. LIMITATIONS OF APPROVALS

1. Architect's approval to proceed with cutting and patching does not waive the right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by the Architect.

END OF SECTION 02 41 19

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1. Footings.
2. Slabs-on-grade (ground).

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete pavement and walks.

C. Coordination: Unless other satisfactory agreements are specifically entered into by contractors concerned, all miscellaneous iron and steel, sleeves, anchors, etc., required by work of other contractors, will be furnished and installed by such other contractors with the cooperation of this contractor.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Agency responsible for field quality control and special inspections.
f. Primary admixture manufacturers.
g. Special concrete finish Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Laboratory test reports for concrete mix design with the following data:

a. Method used to determine the proposed mix design per ACI 301, Article 4.2.3.
b. Gradation and quantity of fine and coarse aggregates.
c. Proportions of all ingredients including all admixtures added either at the time of batching or at the job site.
d. Water/cement ratio and water/cementitious ratio.
e. Slump - ASTM C143.
f. Certification and test results of the total water-soluble chloride ion content of the design mix - FHWA RD-77 or AASHTO T 260-84.
g. Air content of freshly mixed concrete by the pressure method, ASTM C231, or the volumetric method, ASTM C173.
h. Strength at 7 and 28 days - ASTM C39, and 3-day strength for post-tensioned concrete. Document strength on basis of previous field experience or trial mixtures per ACI 301 Article 4.2.3. Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard calculation, and determination of required average compressive strength.

B. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

D. Samples: For: vapor retarder.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.

4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semi-rigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

D. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field-Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

E. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

    a. High-density overlay, Class 1 or better.
    b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    c. Structural 1, B-B or better; mill oiled and edge sealed.
    d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706, deformed.

C. Plain-Steel Wire: ASTM A 1064, as drawn.

D. Deformed-Steel Wire: ASTM A 1064.

E. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.

F. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For slabs on ground, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150, Type I/II.
2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4-inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

F. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494, Type C.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corp. - Construction Chemicals; MasterLife CI 30 (Pre-2014: Rheocrete CNI).
b. Euclid Chemical Company (The); an RPM company; EUCON BCN.
c. GCP Applied Technologies Inc. (formerly Grace Construction Products); DCI.
d. Sika Corporation; Sika CNI.

G. Water: ASTM C 94 and potable.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A 15 mils. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Raven Industries, Inc; Vapor Block 15.
b. Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil).
c. W.R. Meadows, Inc; Perminator 15 mil.

2.7 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. HARDENED CONCRETE FLOORS: For exposed concrete floor areas indicated to be hardened on Drawings (except as otherwise shown or specified): Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

   a. Seal-Hard by L&M Construction Chemicals, Inc.
   b. Ashford Formula by Cure-Crete, Inc.
   c. Euco Diamond Hard by Euclid Chemicals, Inc.

3. MECHANICAL ROOM FLOORS: Penetrating Liquid Floor Treatment for Mechanical Room Floor Slabs:

   a. SLX100 Water and Oil Repellent; ProSoCo, Inc.
   b. PetroTex oil and water repellent; L&M Construction Chemicals.
   c. Eucoguard Vox.
   d. Liqui-Hard; W.R. Meadows
   e. Baracade 244; Euclid Chemical Company

4. SEALED FLOORS: Penetrating Liquid Floor Treatment for all other floor areas indicated to be sealed on drawings:

   a. Chem-Trete BSM 40 manufactured by HULS America.
   b. Iso-Flex 618 manufactured by the Harry S. Peterson Company.
   c. Enviroseal 40 as manufactured by Hydrozo, Inc.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. BASF Corp. - Construction Chemicals; Confilm.
   b. ChemMasters, Inc; Spray-Film.
   c. Dayton Superior; AquaFilm J74RTU.
   d. Euclid Chemical Company (The); an RPM company; Eucobar.
   e. Sika Corporation; SikaFilm.
   f. SpecChem, LLC; Spec Film.
   g. W.R. Meadows, Inc; EVAPRE.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corp. - Construction Chemicals; MasterKure CC 180 WB (Pre-2014: Kure N Seal VOC).
b. ChemMasters, Inc; Safe-Cure Clear DR.
c. Dayton Superior; Clear Cure VOC J7WB.
d. Euclid Chemical Company (The); an RPM company; Kurez DR VOX.
e. SpecChem, LLC; SpecRez.
f. W.R. Meadows, Inc; 1100-CLEAR SERIES.

F. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

a. ChemMasters, Inc; Polyseal WB.
b. Dayton Superior; Cure & Seal 1315 J22WB.
c. Euclid Chemical Company (The); an RPM company; Super Diamond Clear VOX.
d. SpecChem, LLC; Cure & Seal WB 25.
e. W.R. Meadows, Inc; Vocomp-30.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
8. Do not use Fly Ash or Pozzolans, Slag Cement, or Silica Fume in concrete to receive a polished finish.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Do not air entrain interior trowel-finished concrete slabs-on-grade. Do not allow entrapped air content to exceed 3 percent.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches plus or minus 1 inch.

B. Exterior and other concrete exposed to weather: Proportion normal-weight concrete mix as follows:

1. Minimum Compressive Strength: 5000 psi air-entrained.
2. Minimum Cementitious Materials Content: 610 lb./cu. yd.
3. Maximum Water-Cementitious Materials Ratio: 0.40.
4. Slump Limit: 4 inches. 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
5. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2 inches nominal maximum aggregate size.
6. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4 inch nominal maximum aggregate size.

C. Interior Slabs-on-Grade: Proportion normal-weight concrete mix as follows:

1. Minimum Compressive Strength: 4000 psi
2. Minimum Cementitious Materials Content: 540 lb./cu. yd.
3. Maximum Water-Cementitious Materials Ratio: 0.42.
4. Slump Limit: 4 inches. 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture plus or minus 1 inch.
5. Do not use Fly Ash or Pozzolans, Slag Cement, or Silica Fume in concrete to receive a polished finish.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Earth cuts may be used as forms for footing vertical surfaces, if sides are sharp and true, and not exposed in finished structure.

C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

D. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

N. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.
4. No aluminum conduit shall be installed in concrete.
5. No sleeves, holes, or inserts shall be placed in or within 2'-0" of columns or beams without approval of the structural engineer.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
3. For Mass Concrete Elements, leave forms in place a minimum of 7 days and insulate forms as required to minimize excessive temperature differences. Remove forms and insulation only after core temperatures do not exceed the expected average ambient temperatures plus the specified maximum differential.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.

C. Granular Course: For slabs on ground receiving moisture-sensitive floor covering place slab directly on vapor retarder. Place vapor retarder on granular fill or fine-graded granular material, moisten and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

1. Place and compact a 1 inch thick layer of fine-graded granular material over granular fill.

D. Thickness of granular fill (including fine-graded) shall be 6 inch minimum unless noted otherwise in geotechnical report.

3.5 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. No concrete shall be placed except when Architect's representative (or independent testing laboratory) is present unless this requirement is specifically waived by the Architect. Give adequate notice to the Architect, the testing laboratory, and all contractors affected before placing concrete.

C. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified. Concrete delivery tickets shall show:

1. Batch number
2. Mix by number with cement content in pounds and maximum size aggregate
3. Admixtures
4. Air content
5. Slump
6. Time of loading
7. Temperature of concrete for mass concrete elements

D. Discharge concrete within 1-1/2 hours after water has been added to the cement, unless a longer time has been authorized by the Architect/Engineer. During hot weather or other conditions contributing to a quick stiffening of the concrete, the Architect/Engineer may require discharge in less than 1-1/2 hours. If loss of slump occurs, HRWR may be redosed at the site as long as a "flash set" has not occurred. Redosage procedures must be discussed and approved by the Engineer and the manufacturer at the Pre-Concrete Conference.

E. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

F. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

G. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

H. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

I. Place interior slabs on grade that will later receive floor coverings only after floor level or roof above has been placed. Also, protect the slab from any moisture infiltration until building is complete.

J. Pumping Concrete: Grout used to prime a pump shall not be placed in the forms in any concrete exposed to view in the final structure.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete Insert locations.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

   a. For carpeted slabs: Specified overall values of flatness, SOF(F) 25; and of levelness, SOF(L) 20; with minimum local values of flatness, MLF(F) 17; and of levelness, MLF(L) 15.
   b. For polished slabs: Specified overall values of flatness, SOF(F) 45; and of levelness, SOF(L) 35; with minimum local values of flatness, MLF(F) 30; and of levelness, MLF(L) 24.
   c. For all other slabs: Specified overall values of flatness, SOF(F) 35; and of levelness, SOF(L) 25; with minimum local values of flatness, MLF(F) 24; and of levelness, MLF(L) 17.

3. SOF(L) and MLF(L) levelness tolerances shall not apply to cambered or inclined surfaces.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.

b. Continuous water-fog spray.
c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and

mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections and field quality control testing: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

1. Refer to drawings for testing and special inspection requirements.

2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner’s representative), and Contractor. Clearly indicate non-compliance on reports.

B. Non-Compliant Work:

1. The contractor shall remove and replace all non-compliant work, or, at the contractor’s expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner’s representative) for review and approval.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

Mix Design Submittal Form

A copy of this form shall be completed for each type of concrete listed in the specification. Mix designs not submitted on this form will not be reviewed.

Part 1

CONCRETE SUPPLIER INFORMATION

Contact Person: _____

Telephone Number: _____

Company Name: _____

Address: _____

_____

Main Plant Location: _____

Miles from Project Site: _____

PROJECT INFORMATION

Project Name: _____

Address: _____

_____

General Contractor: _____

Concrete Type: _____

Specification Section Reference: _____

Intended Use: _____

Part 2

DETERMINE REQUIRED COMPRESSIVE STRENGTH (select one method)

☐ If field test data is available:

If a group of at least 15 consecutive compressive strength tests meeting the requirements of ACI 301-10 4.2.3.2 are available, calculate the standard deviation and required average compressive strength from ACI 301-10 Table 4.2.3.3.a

Number of Tests: _____

Standard Deviation: _____

K Factor: _____

f'_{cr}: _____

Recorded Field Test Data		
Test	Date	f'c
1		
2		
3		
4		
5		
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30		

☐ If field test data is not available:

If no field compressive strength tests are available, select required average compressive strength from ACI 301-10 Table 4.2.3.3.b

f'_{cr}: _____

Part 3

DOCUMENTATION OF AVERAGE COMPRESSIVE STRENGTH

Two methods of determining expected compressive strength are acceptable including Field Test Data Method and Trial Mix Method. Select one method and provide the data required as described.
Field Test Data Method:

Provide design Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. Utilize the following table. Mix #2 is not required when ten or more consecutive strength tests for one mixture are available. See ACI 301-10 4.2.3.4.a for additional information and requirements.

Materials	Type/Source		Specific Gravity		Weight (lbs.)		Absolute Volume (cu. ft.)	
Mix	#1	#2	#1	#2	#1	#2	#1	#2
Cement								
Fly Ash								
Microsilica								
Coarse Aggregate								
Fine Aggregate								
Water								
Air								
Other								
TOTAL							27.0 cu. ft.	

Mix #1, Water/Cement Ratio: _____

Mix #2, Water/Cement Ratio: _____

☐ If at least 10 strength tests represent one mixture, calculate average compressive strength and verify it is greater than required compressive strength.

Average Compressive Strength (f'c): _____

Required Compressive Strength (f'cr): _____

☐ If at least 10 strength tests represent two mixtures, calculate average compressive strength for each mixture and plot as a function of water/cement ratio. Using the required compressive strength from Part 2, determine the corresponding water/cement ratio.

Required Compressive Strength (f'c): _____

Water/Cement Ratio From Plot: _____ *Attach copy of average compressive strength vs. water cement ratio.*

Establish mixture proportions based upon the required water cementitious ratio. Use the table below to show the actual mixture used on the project. (If one trial mix was used the mixture will match Mix #1)

Field Test Data					
Mix #1	Date	f'c	Mix #2*	Date	f'c
1			1		
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		
21			21		
22			22		
23			23		
24			24		
25			25		
26			26		
27			27		
28			28		
29			29		
30			30		
Average	-		Average	-	

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Trial Mixture Method:

Provide three design mixtures including: Materials, Types, Specific Gravity, Weight and Volume for the concrete being tested. See ACI 301-10 for additional information and requirements.

Materials	Type/Source			Specific Gravity			Weight (lbs.)			Absolute Volume (cu. ft.)		
Trial Mixture	#1	#2	#3	#1	#2	#3	#1	#2	#3	#1	#2	#3
Cement												
Fly Ash												
Microsilica												
Coarse Aggregate												
Fine Aggregate												
Water												
Air												
Other												
Total										27.0 cu. ft.		

Mix #1, Water/Cement Ratio: _____

Mix #2, Water/Cement Ratio: _____

Mix #3, Water/Cement Ratio: _____

Provide compressive test results from above mixtures.

Trial Mix Test Data								
Mix #1	Date	f'c	Mix #2	Date	f'c	Mix #3	Date	f'c
1			1			1		
2			2			2		
3			3			3		
Average	-		Average	-		Average	-	

Plot average compressive strength versus water cement ratio and determine the proper water-cementitious material ratio to meet the required compressive strength from Part 2.

Required Compressive Strength (f'cr): _____

Water/Cementitious Materials Ratio: _____

Establish the mixture proportions based upon the required water cementitious ratio. Use the table below to summarize mixture proportions used on the project.

Materials	Type/Source	Specific Gravity	Weight (lbs.)	Absolute Volume (cu. ft.)
Cement				
Fly Ash				
Microsilica				
Coarse Aggregate				
Fine Aggregate				
Water				
Air				
Other				
TOTAL				27.0 cu. ft.

Additional Requirements/Information:

Please provide the following attachments: (Initial if attached)

Coarse Aggregate Gradation Report _____

Fine Aggregate Gradation Report _____

Concrete Compressive Strength Data _____

Admixture Compatibility Certification Letter _____

Trial Mixture strength vs. water/cement ratio plots _____

SECTION 04200 - UNIT MASONRY

A. WORK INCLUDED

1. The work included under this section consists of furnishing all labor, materials, tools and equipment necessary to complete all unit masonry and related work as shown on the Drawings and specified herein.
2. The extent of each type of unit masonry is shown on the Drawings.

B. JOB CONDITIONS

1. Protect partially complete masonry against weather when work is not in progress by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 2' down both sides of walls and anchor securely in place.

C. SUBMITTALS

1. Test report from independent laboratory indicating results for each of the following:
   a. Concrete Masonry Units: Resultant weight, compressive strength, and water absorption properties, as well as adherence to the following standards:
      1. Test reports shall conform to ASTM C140, and shall include:
         a. Name of Manufacturer.
         b. Date of manufacturer of test specimen.
         c. Dimension measurements.
         d. Calculated gross and net areas.
         e. Total load and net unit load.
         f. Sample weight.
         g. Dry, wet, and immersed weights.
         h. Density.
         i. Moisture content.
         j. Absorption.
         k. Linear shrinkage coefficient.
   b. Submit compression test results from an independent testing laboratory showing the compressive strength of each type and size of concrete masonry units delivered to the construction site, for each 10,000 S.F. of concrete masonry wall construction. Units to be tested shall be selected at random from materials stockpiled at the project site.
   c. Submit a test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work as follows:
      1. Each proposed type and size of concrete masonry unit required.
      2. Each proposed type and size of grouted wall.
2. Letter from each approved manufacturer certifying that provided units will meet or exceed qualities of tested units for each type of masonry unit.
3. Masonry reinforcing steel shop drawings.
4. Written plan for masonry cleaning procedures.

D. QUALITY ASSURANCE

1. Codes and Standards: Comply with the provisions of the following codes, specifications and standards:
   a. Comply with recommendations of National Concrete Masonry Association (NCMA).
   b. ACI 530-99/ASCE 5-99 Building Code Requirements for Masonry Structures.
   c. ACI 530.1-99/ASCE 6-99 Specifications for Masonry Structures.
   d. National Concrete Masonry Association
      1. NCMA TEK Bulletin 3-1 “Cold Weather Concrete Masonry Construction”.
      2. NCMA TEK Bulletin 3-2 “Grouting for Concrete Masonry Walls”.
      3. NCMA TEK Bulletin 7-1 “Fire Resistance Ratings for Concrete Masonry Assemblies”.

5. NCMA TEK Bulletin 7-3 “Fire Safety for Concrete Masonry”.
6. NCMA TEK Bulletin 10-1A “Crack Control in Concrete Masonry Walls”.
7. NCMA TEK Bulletin 10-2A “Control Joints in Concrete Masonry Walls”.
8. NCMA TEK Bulletin 14-2 “Reinforced Concrete Masonry”.
9. NCMA TEK Bulletin 19-4 “Flashing Concrete Masonry”.
10. NCMA TEK Bulletin 19-5 “Use of Flashing in Concrete Masonry”.
11. Standard Practice for Bracing Masonry Walls Under Construction, July 1999.

e. American Society for Testing and Materials (ASTM)
1. ASTM C33-97 “Concrete Aggregates”.
2. ASTM C90-97a “Loadbearing Concrete Masonry Units”.
3. ASTM C140-75 (R-1988) “Standard Methods of Sampling and Testing Concrete Masonry Units”.
4. ASTM C426-06a “Testing for Drying Shrinkage of Concrete Block”.

f. International Masonry Industry All-Weather Council (IMIAWC)
1. “Recommended Practices and Guide Specifications for Cold Weather Masonry Construction-1993”.

2. Field Constructed Sample Panels:
a. Sample Panel for Verification of Materials:
1. Prior to installation of masonry work, erect sample wall panel using materials, bond, and joint tooling shown or specified for final work. Panel shall be approximately 4 feet by 4 feet, indicating the proposed range of color and texture expected in the completed work. Panel shall be used for verification of masonry material units and color selection, for review and acceptance by Architect and Owner.

b. Field Constructed Mock-Up Panels
1. The first 100 square feet of each masonry wall type or pattern type installed shall serve as a mock-up panel for Architect/Owner approval of workmanship, including installation of masonry, exposed and concealed, anchors, flashing, and control joints, including sealant. The sample area when accepted, shall become the project standard for quality of work, methods of installation and appearance. Protect accepted mock-up area of work throughout duration of project, to become part of completed work.

E. MATERIALS

1. Face Brick: Belden Brick Company – Utility 8601 “Beaumont Blend”.
2. Concrete Masonry Units (CMU):
a. Manufacturer: Shall be a member of the National Concrete Masonry Association.
b. Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8” high, (15-5/8" x 7-5/8" actual), unless otherwise shown. See drawings for required wythe dimesions.
c. Special Shapes: Provide, where shown and where required, lintels, corners, jambs, sash, control joints, headers, bond beams, bullnose, and other special conditions. Provide (2) two core type units where required to receive vertical reinforcing.
1. Provide one inch radius bullnose at external corners and edges unless otherwise noted.
d. Fire Resistance: Furnish units with specified fire resistance classification, where indicated on the Drawings.
e. Integral Water Repellent: Provide Integral Water Repellent at all exterior CMU, complying with ASTM E 514 wind driven rain permanence Class E rating.
f. Linear shrinkage: Not to exceed 0.065 percent, in accordance with ASTM C 426.
g. Hollow Load-Bearing Concrete Masonry Units:
1. Provide units complying with ASTM C 90, Grade N.
2. Compressive Strength: 1,900 psi average, 1,700 psi minimum.
3. Weight Classification: Normal Weight.
h. Solid Load-Bearing Concrete Masonry Units:
1. Provide units complying with ASTM C 90, Grade N.
2. Compressive Strength: 1,800 psi average, 1,500 psi minimum.

3. Weight Classification: Normal Weight.

i. Exposed Face: Manufacturer's standard color and texture, unless otherwise noted.

j. Below grade units, (except interior partitions), and above grade load bearing units shall comply with ASTM C 90, Grade N.

k. Curing: Cure units in a moisture - controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90, Type 1.

3. Mortar & Grout Materials:

a. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather protection.

b. Hydrated lime: ASTM C 207. Type S.

c. Sand: ASTM C 144, except for joints less than 1/4" use aggregate graded with 100% passing the #16 seive.

d. Color: Colored mortar to be selected for brick veneer, to match existing adjacent brickwork.

4. Mortar Mixes:

a. Do not lower the freezing point of mortar by use of admixtures or anti-freeze agents.

b. Mortar for unit masonry: Comply with ASTM C 270, Proportion Specifications, except limit materials to those specified herein, and limit cement/lime ratio by volume as follows: Type S: (All Masonry work) - not more than 1/2 part lime per part of Portland Cement.

5. Grout Materials:

a. Grout for Unit Masonry

1. Comply with ASTM C 476. Use grout of consistency (fine or course) at time of placement that will completely fill spaces intended to receive grout.

a. Use fine grout in spaces less than 2" in horizontal dimension.

b. Use course grout in spaces 2" or more in least horizontal dimension.

2. Aggregate: ASTM C 404.

3. Do not use calcium chloride.

4. Placement:

a. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

b. Do not exceed the following pour heights for fine grout:

1. For minimum widths of grout spaces of ¾" or for minimum grout space of hollow unit cells of 1-1/2" by 2", pour height of 12".

2. For minimum widths of grout spaces of 2" or for minimum grout space of hollow unit cells of 2" by 3", pour height of 60".

3. For minimum widths of grout spaces of 2-1/2" or for minimum grout space of hollow unit cells of 2-1/2" by 3", pour height of 12 feet.

4. For minimum widths of grout spaces of 3" or for minimum grout space of hollow unit cells of 3" by 3", pour height of 24 feet.

c. Do not exceed the following pour heights for course grout:

1. For minimum widths of grout spaces of 1-1/2" or for minimum grout space of hollow unit cells of 1-1/2" by 3", pour height of 12".

2. For minimum widths of grout spaces of 2" or for minimum grout space of hollow unit cells of 2-1/2" by 3", pour height of 60".

3. For minimum widths of grout spaces of 2-1/2" or for minimum grout space of hollow unit cells of 3" by 3", pour height of 12 feet.

4. For minimum widths of grout spaces of 3" or for minimum grout space of hollow unit cells of 3" by 4", pour height of 24 feet.

d. Provide cleanout holes at least 3" in least dimension for grout pours over 60" in height.

1. Provide cleanout holes at each vertical reinforcing bar.

2. At solid grouted masonry, provide cleanout holes at not more than 32" o.c.

e. Grout will be sampled and tested for compressive strength per ASTM C 1019.

b. Non-Shrink Grout

1. Pre-mixed metallic aggregate, complying with ASTM C 476.
2. Acceptable manufacturer's and products:
   a. Master Builders, Inc. – "Embeco".
   b. Sonneborn Building Products – "Ferrolith G".
   c. Chem Master – "Metox RM".
   d. Euclid Chemical – "Firmes".
3. Comply with applicable requirements of ANSI/NBS "Building Code Requirements for Reinforced Masonry"; and ACI 531 "Building Code Requirements for Concrete Masonry Structures".

6. Masonry Accessories:
   a. Individual wire ties for masonry: Fabricate from 3/16" cold-drawn steel wire, ASTM A 82, unless otherwise indicated of the length required for proper embedment in wythes of masonry shown and crimped if used in cavity wall construction.
7. Flashings for masonry:
   a. Thru-wall flashing: Provide concealed flashings shown to be built into masonry as follows: Vinyl Masonry Flashing: PVC with plasterizers and modifiers, formed into a 20-mil flexible sheet.

F. INSTALLATION AND WORKMANSHIP

1. Inspection: Masonry installer must examine the areas and conditions under which masonry is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to masonry installer.
2. Chipped, cracked or otherwise damaged or imperfect CMU units shall not be installed. Exposed faces of CMU in exposed wall construction shall not exhibit chips, cracks or imperfections when viewed at a distance of not less than 10 feet under diffused lighting. Note: This requirement supersedes the tolerances listed in ASTM C90 Section 7.2. Installed CMU not meeting this criteria shall be rejected, and shall be replaced at no cost to the Owner.
3. Installation - General
   a. Build masonry construction to the full thickness shown, except build single wythe walls, if any, to the actual thickness of the masonry units using units of nominal thickness shown or specified.
   b. Cut masonry units with motor-driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible. All cut units shall be placed at inside corners wherever possible.
   c. Wet brick having ASTM C 67 absorption rate greater than 0.025 oz. per square inch per minute. Determine absorption by drawing a circle the size of a quarter on typical units and place 20 drops of water inside the circle. Wet brick units only if water absorbed within 1-1/2 minutes.
   d. Do not wet concrete masonry units.
   e. Frozen materials and work: Do not use frozen materials or material mixed or coated with ice or frost. For masonry which is specified to be wetted, comply with the BIA Recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.
   f. Do not lower the freezing point of mortar by use of admixtures, anti-freeze agents, or accelerating agents.
   g. Do not use calcium chloride in mortar for any exposed brick.
   h. Pattern Bond: Lay exposed masonry in the bond pattern shown, or if not shown, lay in ½ running bond. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2". Bond and interlock each course of each wythe at corners, unless otherwise shown.
   i. Layout walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and wherever possible at other locations.
   j. Lay up walls plumb and true, and with courses level, accurately spaced and coordinated with other work.
   k. Stopping and resuming work: Rake back 1/2 masonry unit length in each course, do not tooth. Clean exposed surfaces of set masonry, wet units lightly, if specified to be wetted, and remove loose

masonry units and mortar prior to laying fresh masonry.

l. Built-in work: As the work progresses, build-in items specified under this and other sections of these Specifications. Fill space between hollow metal frames and masonry solidly with mortar. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

4. Mortar Bedding and Jointing
   a. Mortar mixes: ASTM C 270, Proportion Specification, and of the types herein before specified.
   b. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Do not use mortar which has begun to set or if more than 2-1/2 hours has elapsed since initial mixing. Retemper mortar during 2-1/2 hour period as required to restore workability.
   c. Lay brick and other solid masonry units with completely filled bed and head joints. Butter ends with sufficient mortar to fill head joint and shove into place. Do not slush head joints.
   d. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells, also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
   e. Joints:
      1. All exposed CMU and brick shall have 3/8" tooled joints. Variations of all joints shall not exceed 1/16". Note: This requirement supersedes the tolerances listed in ACI 530.1-99/ASCE 6-99.
      2. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials.
      3. Rake out mortar in preparation for application of caulking or sealants where shown.
   f. Remove masonry units disturbed after laying. Clean and re-lay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required remove units, clean off mortar, and reset in fresh mortar.
   g. Fill joints between wythes solidly with mortar by parging either the back of the facing or the face of the backing and shove units solidly into parging.
5. Anchoring Masonry Work
   a. Provide anchoring devices of the type shown and as specified, if not shown, or specified, provide standard type for facing and back-up involved.
6. Control and Expansion Joints
   a. Provide vertical expansion, control and isolation joints in masonry where shown. Build in related masonry accessory items as the masonry work progresses. Rake out mortar in preparation for application of caulking and sealants. See Section 07 92 00 for Sealants and Caulking.
   b. Control Joint locations in CMU: Provide vertical control joints in CMU where indicated, or if not indicated, in accordance with NCMA TEK Bulletins 10-1A and 10-2A, and at all offsets, returns, openings, and intersections with dissimilar materials, and as follows to prevent cracking:
      1. At change from wall bearing on foundation wall to wall bearing on floor slab.
      2. At change from exterior wall to interior wall.
      3. At walls setting on floors that cross floor construction.
      4. At columns within masonry walls.
      5. At changes in wall thickness.
      6. Stop joint reinforcement bars on either side of control joints. Extend reinforcing bars in bond beams continuously through control joints and sleeves for bond break 18 inches each side of joint.
      7. Install control joints in concrete masonry units with pre-fabricated shear key.
      8. At end of lintel bearing on one end of openings less than or equal to 6'-4", and at both ends of openings greater than 6'-4".
      9. Straight runs: Maximum 24 feet.
7. Flashing of Masonry Work
   a. Provide concealed flashings in masonry work as shown. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through-wall flashing on bed of mortar and

cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/2" from face of wall, unless otherwise shown. Extend flashing beyond edge of lintels and sills at least 4" and turn up edge on sides to form pan to direct moisture to exterior. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings spaced 24" o.c..

b. Install flashings in accordance with manufacturer's instructions.

8. Repair, Pointing, and Cleaning
   a. Remove and replace masonry units which are loose, broken, stained, or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout pointed to eliminate evidence of replacement.
   b. During the tooling of joints, enlarge any voids, except weep holes and completely fill with mortar. Point-up all joints at corners, openings, and adjacent work to provide a neat uniform appearance, properly prepared for application of caulking or sealant compounds.
   c. After all holes have been pointed, all new masonry walls shall be cleaned with bristle brushes and clear water to remove stains and foreign materials. Cleaning compounds, acids, and other injurious cleaners are not permitted.
   d. Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings.

END OF SECTION 04 20 00

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.
3. Other Steel: loose lintels, beam lintels.
4. Steel joist bearing plates.
5. Structural thermal breaks for bolted structural steel connections.

B. Related Requirements:
1. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" except as modified in this section.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical, high-strength bolted connections.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, shop-painting applicators, and professional engineer.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Non-shrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

C. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Allowable Stress Design; data are given at service-load level.
3. Unless noted otherwise on design drawings, design and provide stiffeners, plates, etc., in connections where needed.

B. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer to prepare structural analysis data for structural-steel connections.

2.2 STRUCTURAL-STEEL MATERIALS

A. W Shapes: ASTM A 572, Grade 50.

B. Channels, Angles, M, S-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C, structural tubing.

F. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847, structural tubing.

G. Steel Forgings: ASTM A 668.

H. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM F 3125, Grade A 325, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

B. Unheaded Anchor Rods: ASTM F 1554, Grade 55, weldable.

1. Configuration: Hooked.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36 carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Plain.

C. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

D. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563hex carbon steel.
2. Washers: ASTM A 36 carbon steel.
3. Finish: Plain.

2.4 PRIMER

A. Interior Steel Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Exterior Steel Primer: SSPC-Paint 20, Type I, Level 1 zinc rich coating.

C. Galvanizing Repair Paint: ASTM A 780.

2.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
   1. Fabricate beams with rolling camber up.
   2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill,or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

   1. Joint Type: Pre-tensioned.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

C. Design of Connections: Typical AISC connections are to be used except where otherwise shown. Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. For interior steel not exposed to view: SSPC-SP 3, "Power Tool Cleaning."
2. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
3. For steel to be hot-dipped galvanized: SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, beam lintels, and shelf angles, located in exterior walls.

B. All welded assemblies to be galvanized shall be prepared according to Recommended Practice for Providing High Quality Zinc Coatings (Hot-Dip) on Assembled Products (ASTM A 385).

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using High-Strength Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Joint Type: Pre-tensioned.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections and field quality control testing: Owner will engage a qualified special inspector to perform field tests and inspections and prepare test reports.

1. Refer to drawings for testing and special inspection requirements.

2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner's representative), and Contractor. Clearly indicate non-compliance on reports.

B. Non-Compliant Work:

1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. LH-series long-span steel joists.
3. Joist accessories.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing bearing plates in concrete.
2. Section 042000 "Unit Masonry" for installing bearing plates in unit masonry.
3. Section 051200 “Structural Steel Framing” for furnishing bearing plates and anchors to be set in concrete and masonry

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

1.4 ACTION SUBMITTALS

A. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Welding certificates.

C. Manufacturer certificates. Signed by manufacturers certifying that joists comply with requirements.

D. Mill Certificates: For each type of bolt. For each type of bolt signed by bolt manufacturers certifying that bolts comply with requirements.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

2. Professional Engineer Qualifications: A professional engineer who is legally authorized to practices in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installation of joists that are similar to those indicated for this Project in material, design, and extent.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

C. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

D. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Deliver steel bearing plates to be built into masonry construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level.

2. Design special joists to withstand design loads with live-load deflections no greater than the following:
   a. Roof Joists: Vertical deflection of 1/360 of the span.

2.2 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

   1. Joist Type: K-series steel joists.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Provide holes in chord members for connecting and securing other construction to joists. Reduce joist load-carrying capacity proportionately to reduction in chord area.

D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

F. Camber joists according to SJI's "Specifications.".

G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

H. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.

2.3 LH-SERIES STEEL JOISTS

A. Long-Span Steel Joist: Manufactured steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated on Drawings.

   1. Joist Type: LH-series long-span steel joists.
   2. End Arrangement: Underslung.
   3. Top-Chord Arrangement: Parallel.

B. Provide holes in chord members for connecting and securing other construction to joists. Reduce joist load-carrying capacity proportionately to reduction in chord area.

C. Camber joists according to SJI's "Specifications.".

D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.5 JOIST ACCESSORIES

A. Bridging: Unless noted otherwise, Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Fabricate steel bearing plates from ASTM A 36 steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

D. Steel bearing plates with integral anchorages are specified in Section 051200 "Structural Steel Framing"

E. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

1. Finish: Plain, uncoated.

F. High-Strength Bolts, Nuts, and Washers: ASTM F 3125, Grade A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

G. Welding Electrodes: Comply with AWS standards.

H. Galvanizing Repair Paint: ASTM A 780.

I. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.6 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2.

B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. No field modifications to the joists will be permitted unless approved by Architect/Engineer and the joist manufacturer.

C. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

D. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

E. Where bolting of joists to supporting steel is shown on drawings, bolt joists to supporting steel framework using carbon-steel bolts.

F. Where bolting of joists to supporting steel is shown on drawings, bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for high-strength structural bolt installation and tightening requirements.

G. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Special Inspections and field quality control testing: Owner will engage a qualified special inspector to perform field tests and inspections and prepare test reports.

1. Refer to drawings for testing and special inspection requirements.

2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner’s representative), and Contractor. Clearly indicate non-compliance on reports.

B. Non-Compliant Work:

1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

3.4 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2 or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof deck.
2. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.

1.3 ACTION SUBMITTALS

A. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Special Inspector Qualifications: A qualified person employed or retained by an approved agency that has the recommended experience and certifications as summarized in Appendix C of the current International Code Council (ICC) Special Inspection Manual.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI RD 1.0-2006 Standard for Steel Roof Deck", and with the following:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Deck Profile: As indicated on drawings.
3. Profile Depth: As indicated on drawings.
4. Design Uncoated-Steel Thickness: As indicated on drawings.
5. Span Condition: Triple span or more.
6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI NC 1.0-2006 Standard for Non-Composite Steel Deck", with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Profile Depth, Thickness, Span and Configuration: Provide deck of depth, thickness, and configuration to support the dead load of the concrete plus 25 pounds per square foot construction loads while sustaining only a maximum of L/240 deflection when placed over number of spans used.
3. Span Condition: Triple span or more.
4. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI C or NC standards for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: ASTM A 780.

J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI R 1.0, SDI C 1.0, and SDI NC 1.0, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch, nominal.
2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds 12 inches apart in the field of roof and 6 inches apart in roof corners and perimeter, based on roof-area definitions in FMG Loss Prevention Data Sheet 1-28.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.
3. Fasten with a minimum of 1-1/2-inch-long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

A. Special Inspections and field quality control testing: Owner will engage a qualified special inspector to perform field tests and inspections and prepare test reports.

1. Refer to drawings for testing and special inspection requirements.

2. Prepare and submit reports within 7 days of completing tests and inspections. Distribute reports to Architect, Engineer, Owner (or owner's representative), and Contractor. Clearly indicate non-compliance on reports.

B. Non-Compliant Work:

1. The contractor shall remove and replace all non-compliant work, or, at the contractor's expense, perform additional testing to verify compliance. Contractor shall submit results of additional testing to Architect, Engineer, and Owner (or owner's representative) for review and approval.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

END OF SECTION 053100

SECTION 05 50 00 - METAL FABRICATION AND MISCELLANEOUS METAL

A. WORK INCLUDED

1. The work included under this section consists of furnishing all labor, material, tools, and equipment necessary to fabricate, furnish, and install, (unless shown or specified to be installed in other sections), all metal fabrications and miscellaneous metal items as shown on the Drawings or specified herein.
2. Items to be furnished and installed under this section include in general, but are not strictly limited to the following:
   b. Concrete-filled Galvanized Steel Bollards

B. SHOP DRAWINGS

1. Show complete details including plans, elevations, sections and details and attachments to other work.
2. Provide templates anchors and bolts specified for installation under other sections by others, and instructions for fabrications, assembly, and installation. Locate anchor bolts and devices required for installation in other work.
3. Drawings shall also include appropriate ASTM reference numbers with prime painting and galvanizing notes.
4. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. METAL FABRICATIONS

1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete work. Furnish setting drawings, templates and directions for installing anchorages, including concrete inserts, anchor bolts, embeds that are to be embedded in masonry or concrete. Deliver such items to project site in time for installation.
2. Fabricate miscellaneous units to sizes, shapes and profiles shown, or if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars of welded construction, using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

D. GENERAL REQUIREMENTS

1. Furnish inserts and anchoring devices to be built into other work for installation of miscellaneous metal items.
2. Steel Plates, Shapes, Bars: ASTM A 36.
3. Tubular Steel Items: Pipe, ASTM A 120.
4. Metal Primer Paint: Red Oxide or similar. FS TT-P-86, Type II, or SSPC 14. Apply to prepared steel surfaces at rate to provide a 2.0 mil dry film thickness.
5. Galvanizing: ASTM A 386 for assembled products: A153 for iron and steel hardware.
6. Fabrication--General: Use materials of size and thickness shown, or, if not shown, of required size and thickness to produce strength and durability.
7. Steel Pipe: ASTM A 53; type as selected; Grade A; black finish, unless galvanizing is required; welded and seamless; standard weight (Schedule 40), unless otherwise indicated..
   a. Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 09 90 00.

E. FABRICATION

1. Workmanship: Use materials of size and thickness shown or, if not shown of required size and thickness of product strength and durability in finished product. Work to dimensions shown or accepted on Shop Drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
2. Form exposed work true to line and level, with accurate angles and surfaces, and straight sharp edges. Ease exposed edges to a radius of approximately 1/32", unless otherwise shown. Form bent metal corners to

smallest radius possible without causing grain separation or otherwise impairing work.

3. Weld corners and seams continuously, complying with AWS recommendations at exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.
4. Form exposed connections with hairline joints, flush, and smooth, using concealed fasteners wherever possible.
5. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.
6. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
7. Galvanizing: Galvanize all exterior steel systems as described in Section 05120 - Structural Steel.

G. INSTALLATION

1. Install all fabricated components and systems to be plumb, level, true, and properly aligned with adjacent work.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY

A. SUMMARY

1. This Section includes the following:
   a. Framing with dimension lumber.
   b. Wood furring, grounds, nailers, and blocking.
   c. Sheathing.
   d. Fasteners and metal framing anchors.

B. REFERENCES

1. American Forest and Paper Association (AFPA) - Manual for Wood Frame Construction
2. American National Standards Institute (ANSI) - A208.1 Mat-Formed Manufactured Panels
3. Engineered Wood Association - Form E30 Engineered Wood Design/Construction Guide
4. American Society of Mechanical Engineers (ASME)
   a. B18.2.1 Square and Hex Bolts and Screws - Inch Series
   b. B18.6.1 Wood Screws (Inch Series)
5. American Society for Testing and Materials (ASTM)
   a. A153 Specification for Zinc -Coating (Hot-Dip of Iron and Steel Hardware)
   b. A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
   c. A563 Specification for Carbon and Alloy Steel Nuts
   d. A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   e. D245 Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber
   f. D2555 Test Method for Establishing Clear Wood Strength Values
6. American Wood Preservers Association (AWPA)
   a. C2 Lumber, Pressure Treatment
   b. C9 Plywood, Pressure Treatment
   c. C20 Structural Lumber, Fire-Retardant Pressure Treatment
   d. C27 Plywood, Fire-Retardant Pressure Treatment
   e. M4 Standard for the Care of Preservative-Treated Wood Products
7. Ohio Building Code - Chapter 23 Wood
8. U.S. Department of Commerce, National Institute of Standards and Technology
   a. PS 1 US Product Standard for Construction and Industrial Plywood
   b. PS 2 Performance Standard for Wood-Based Structural-Use Panels
   c. PS 20 American Softwood Lumber Standard (ASLS)

C. SUBMITTALS

1. General: Submit the following in accordance with the conditions of Contract and Section 01330, "Submittal Procedures."
2. Product Data: Submit manufacturer's product data for each distinct product specified.
3. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use, and design values approved by American Lumber Standards Committee's (ALSC) Board of Review.
4. Wood treatment data as follows, including chemical treatment manufacturer's warranty and instructions for handling, storing, installing, and finishing treated materials:
   a. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
   b. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
   c. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

D. QUALITY ASSURANCE
1. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by single producer.

E. DELIVERY, STORAGE, AND HANDLING
1. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.
2. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
3. Protect sheet materials during handling to prevent breaking of corners and damage to surfaces.

F. LUMBER, GENERAL
1. Lumber Standards: Comply with PS 20-99, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review. Lumber design values are to comply with ASTM D245 and ASTM D2555.
2. Inspection Agencies: Inspection agencies, and their grading rules include the following:
   a. Northeastern Lumber Manufactures Association (NELMA) - Standard Grading Rules
   b. National Lumber Grades Authority (NLGA)(Canadian) - Standard Grading Rules
   c. Redwood Inspection Service (RIS) - Standard Specifications for Grades of California Redwood Lumber
   d. Southern Pine Inspection Bureau (SPIB) - Standard Grading Rules for Southern Pine Lumber
   e. West Coast Lumber Inspection Bureau (WCLIB) - No. 17 Standard Grading Rules for West Coast Lumber
   f. Western Wood Products Association (WWPA) - Western Lumber Grading Rules
3. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
   a. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
4. Where nominal sizes are indicated, provide actual sizes required by PS 20-99 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   a. Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.
   b. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38 mm actual) thickness or less, unless otherwise indicated.

G. WOOD-PRESERVATIVE-TREATED MATERIALS
1. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with Quality Mark Requirements of inspection agency approved by ALSC's Board of Review. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
2. Pressure treat above ground items with waterborne preservatives to minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m.). After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
   a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   c. Wood framing members less than 18 inches (460 mm) above grade.
3. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m.).

4. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

H. DIMENSION LUMBER

1. General: If not indicated on Contract Documents, provide dimension lumber of any species and grades indicated for applicable use category listed in table below. Lumber shall comply with ALSC National Grading Rule (NGR) provisions of inspection agency applicable to species.

PRODUCT (Nominal Dimension)	GRADE	USE
Structural Light Framing 2 to 4 inches thick 2 to 4 inches wide	Select Structural No. 1 No. 2 No. 3	Structural applications where highest design values are needed in light framing sizes.
Light Framing 2 to 4 inches thick 2 to 4 inches wide	Construction Standard Utility	Where high-strength values are not required, such as wall framing, plates, sills, cripples, and blocking.

2. Species and grades must meet or exceed the following values, unless indicated otherwise on Contract documents.
   a. F_b (extreme fiber stress in bending): Minimum 850 psi (5.9 MPa).
   b. E (modulus of elasticity): Minimum 1,300,000 psi (8950 MPa).

I. MISCELLANEOUS LUMBER

1. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
2. Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on Contract documents.
3. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
4. Grade and Species: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common or Standard grade per WWPA of any species.

J. WOOD-BASED STRUCTURAL-USE PANELS, GENERAL

1. Structural-Use Panel Standards: Panel thickness, grade, veneer qualities and group number or span rating, shall be as shown on Drawings, and in accordance with recommendations of APA. Comply with PS 1 for plywood panels, and PS 2 for products not manufactured under PS 1 provisions.
   a. Panels which have any edge or surface permanently exposed to weather shall be classed Exterior Grade.
   b. Panel thickness, grade, and group number or span rating shall be at least equal to that shown on Drawings.
   c. Application shall be in accordance with recommendations of APA.
2. Trademark: Factory-mark each structural-use panel with APA trademark evidencing compliance with grade requirements.

K. CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

1. General: Where structural-use panels are indicated for concealed types of applications, provide APA performance rated panels complying with requirements indicated for grade designation, span rating, exposure durability classification, and edge detail (where applicable).
   a. Provide panel clips for edge support as recommended by panel manufacturer, or where required by IBC.
   b. Provide panels of thickness meeting requirements specified, but not less than thickness indicated.
2. Roof Sheathing: APA-rated sheathing.
   a. Exposure Durability Classification: Exposure 1.
   b. Span Rating: As required to suit joist or truss spacing indicated.

L. STRUCTURAL-USE PANELS FOR BACKING

1. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade C-D plugged Exposure 1, in thickness indicated on Contract documents or, if not otherwise indicated, not less than 15/32 inch (11.9 mm) thick.

M. FASTENERS

1. General: Provide fasteners of size and type indicated, that comply with requirements specified.
   Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A153
2. Nails, Wire, Brads, and Staples: ASTM F1667
3. Wood Screws: ASME B18.6.1.
4. Lag Bolts: ASME B18.2.1.
5. Bolts: Steel bolts complying with ASTM A307, Grade A with ASTM A563 hex nuts and, where indicated, flat washers.

N. INSTALLATION

1. General:
   a. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
   b. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
   c. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
   d. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
   e. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with IBC Table 2304.9.1 Fastening Schedule.
2. Wood Grounds, Nailers, Blocking and Sleepers
   a. Install wood grounds, nailers, blocking, and sleepers where shown, and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
   b. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
   c. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches (38.1 mm) wide, and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.
3. Wood Furring
   a. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
   b. Firestop furred spaces of walls at each floor level, and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.
4. Wood Framing, General

a. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
b. Install framing members of size and at spacing indicated.
c. Do not splice structural members between supports.

8. Installation of Structural-Use Panels
   a. General: Comply with applicable recommendations contained in APA Form No. E30, for types of structural-use panels and applications indicated.
   b. Fastening Methods: Fasten panels as indicated below:
      1. Sheathing: Screw to framing. Space panels 1/8 inch (3.18 mm) at edges and ends.
      2. Plywood Backing Panels: Nail or screw to supports.

END OF SECTION 06 10 00

SECTION 06 61 16 - SOLID POLYMER FABRICATIONS

A. WORK INCLUDED

1. Provide all material, labor, tools and equipment necessary to furnish and install solid polymer fabrications as indicated on the Drawings and as specified herein.
2. Solid polymer fabrications include the following:
   a. Windowsills

B. RELATED SECTIONS

1. Section 06 10 00 – Rough Carpentry

C. REFERENCES

1. American National Standards Institute (ANSI)
2. American Society for Testing and Materials (ASTM)

D. SUBMITTALS

1. Submit under provisions of Division 1.
2. Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.
3. Shop Drawings:
   a. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
      1. Show full-size details, edge details, thermoforming requirements, attachments, etc.
      2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
      3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.
4. Samples:
   a. For each type of product indicated.
      1. Submit minimum 6-inch by 6-inch sample in specified gloss.
      2. Cut sample and seam together for representation of inconspicuous seam.
      3. Indicate full range of color and pattern variation.
   b. Approved samples will be retained as a standard for work.
5. Maintenance data:
   a. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
      1. Maintenance kit for finishes shall be submitted.
   b. Include in project closeout documents.

E. QUALITY ASSURANCE

1. Qualifications:
   a. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.
   b. Fabricator/installer qualifications: Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.
2. Applicable standards:
   a. Standards of the following, as referenced herein:
      1. American National Standards Institute (ANSI)
      2. American Society for Testing and Materials (ASTM)
      3. National Electrical Manufacturers Association (NEMA)

4. NSF International
b. Fire test response characteristics:
1. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:
a. Flame Spread Index: 25 or less.
b. Smoke Developed Index: 450 or less.

F. DELIVERY, STORAGE, AND HANDLING
1. Deliver no components to project site until areas are ready for installation. Store components indoors prior to installation.
2. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

G. WARRANTY
1. Provide manufacturer's 10 year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

H. MANUFACTURERS
1. Acceptable Manufacturers – Price Category 5.
a. DuPont-Corian.
b. Formica Corporation.
c. Wilsonart.

I. MATERIALS
1. Solid Polymer Material: Homogeneous filled acrylic meeting ANSI Z124.3 and Z124.6, Type Six, and FS WW-P-541E/GEN; not coated, laminated, or of composite construction.
2. Price Category: 1 thru 4
3. Tensile Strength: 6,000 psi minimum, per ASTM D 638.
4. Tensile Modulus: 1,500,000 psi minimum, per ASTM D 638.
5. Flexural Strength: 10,000 psi minimum, per ASTM D 790.
6. Flexural Modulus: 1,200,000 psi minimum, per ASTM D 790.
7. Elongation: 0.4 percent minimum, per ASTM D 638.
8. Hardness: 85-Rockwell "M" scale minimum.
9. Thermal Expansion: 1.80 x 10^6 inch/inch/F degree maximum, per ASTM D 696.
10. Color Stability: No change, 100 hours minimum, per NEMA LD3-3.10.
11. Gloss (60° Gardner): 5–75 (matte—highly polished), per ANSI Z124.
12. Light Resistance: (Xenon Arc) No effect, per NEMA LD 3-2000.
13. Fungus and Bacteria Resistance: Does not support microbial growth, per ASTM G21&G22
14. Wear and Cleanability: Passes ANSI Z124.3 and Z124.6.
15. Abrasion Resistance: No loss of pattern, maximum weight loss (1,000 cycles) equal to 0.9 g, per NEMA LD3-3.01, ANSI Z124.3.
16. Boiling Water Surface Resistance: No change, per NEMA LD3-3.05.
17. High Temperature Resistance: No change, per NEMA LD3-3.06.
18. Impact Resistance:
a. (Notched Izod): 0.28 foot-pounds minimum, per ASTM D 256, Method A.
b. (Gardner Ball Drop): 9.0 foot-pounds minimum, per ASTM D 5420.
c. 1/2 inch Sheet: 140 inches minimum, 1/2 pound ball, no failure per NEMA LD3-3.03.

19. Stain Resistance: Passes ANSI Z124.3 and Z124.6.
20. Water Absorption by Weight: Maximum percent, per ASTM D 570.
21. Flammability: 25 flame spread, 25 smoke developed, Class 1, per ASTM E 84.

J. ACCESSORIES
1. Joint adhesive: Manufacturer's standard adhesive kit to create inconspicuous, nonporous joints.
2. Sealant: Manufacturer's standard UL-listed silicone sealant in colors matching components.

K. SOLID POLYMER FABRICATIONS
1. Window Sills: 1/2" Solid polymer material; adhesively joined with inconspicuous seams.

L. FABRICATION
1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and solid polymer manufacturer requirements.
2. Form joints between components using manufacturer's standard joint adhesive, joints inconspicuous in appearance and without voids.
3. Rout and finish component edges to a smooth, uniform finish. Repair or reject defective or inaccurate work.
4. Finish all surfaces uniformly - Semigloss: Gloss rating of 25-50.
5. Allowable Tolerances: Variation in Component Size: Plus or minus 1/8 inch.

M. EXAMINATION
1. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

N. INSTALLATION
1. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings, product data and installation details.
   a. Provide product in the largest pieces available.
   b. Exposed joints/seams shall not be allowed.
   c. Cut and finish component edges with clean, sharp returns.
   d. Rout radii and contours to template.
   f. Anchor securely to substrate.
   g. Carefully remove surface scratches and clean entire surface.

O. REPAIR
1. Repair or replace damaged work which cannot be repaired to Architect's satisfaction.
2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

P. CLEANING AND PROTECTION
1. Keep components clean during installation.
2. Remove adhesives, sealants and other stains.

END OF SECTION 06 61 16

SECTION 07 21 00 - BUILDING INSULATION

A. SUMMARY

1. The work included in this section consists of furnishing all labor, materials, tools, and equipment necessary to furnish and install the following types of thermal insulation:
   a. Rigid Perimeter Masonry Cavity Insulation – Above Grade.
   b. Rigid Perimeter Insulation – Below Grade.
   c. Batt-type Fiberglass Thermal Insulation.
   d. Batt-type Fiberglass Sound Insulation.
2. Related Sections:
   a. Division 4 Section 04 20 00 - Unit Masonry
   b. Division 7 Section 07 22 16 - Roof Deck Insulation.
   c. Division 7 Section 07 53 23 – EPDM Roofing System.
   d. Division 7 Section 07 92 00 - Joint Sealants.
   e. Division 9 Section 09 21 16 - Gypsum Board Assemblies.
   f. Division 9 Section 09 51 13 - Acoustical Ceiling Systems.
   g. Division 23 Section 23 07 13 - Mechanical: Duct and equipment insulation, and pipe insulation.

B. REFERENCES

1. ASTM International:
   a. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
   b. ASTM C356 Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat.
   c. ASTM C411 Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
   d. ASTM C423 Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   e. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
   f. ASTM C612 Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
   g. ASTM C1304 Standard Test Method for Assessing the Odor Emission of Thermal Insulation Materials.
   h. ASTM C1320 Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
   i. ASTM C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
   j. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   k. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
   l. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
   m. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
2. Federal Specification HH-I-521F: Insulation Blankets, Thermal (Mineral Fiber, For Ambient Temperatures).

C. SUBMITTALS

1. General: Submit listed submittals in accordance with provisions of Section 01300 Administrative Requirements.
2. Product Data: Manufacturer's data sheets on each product to be used, including:
   a. Preparation instructions and recommendations.

b. Storage and handling requirements and recommendations.
c. Installation methods.

3. Samples: Submit manufacturer's standard selection and verification samples.
4. Quality Assurance/Control Submittals: Submit the following:
   a. Test Reports: Upon request, submit test reports from recognized test laboratories.
   b. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

D. QUALITY ASSURANCE

1. Obtain each type of building insulation through a single source.
2. Manufacturer Qualifications: Manufacturer with a minimum of ten years experience manufacturing products in this section shall provide all products listed.
3. Installer Qualifications: Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five years experience successfully installing insulation on projects of similar type and scope as specified in this section.

E. DELIVERY, STORAGE & HANDLING

1. General: Comply with Division 1 Product Requirement Section.
2. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
3. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

F. PROJECT CONDITIONS

1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

G. PRODUCTS

1. Insulating Materials - General:
   a. General: Provide insulating materials that comply with requirements and referenced standards.
      1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths and lengths.
2. Rigid Perimeter Wall Insulation – Below Grade.
   a. Rigid Insulation, 1-1/2" thick, 24" wide with a minimum R-Value of 7.50, closed-cell, extruded polystyrene foam.
   b. Acceptable Products and Manufacturers:
      1. "Styrofoam SM" – Dow Chemical Co.
      2. "Foamular 150" – UC Industries
      3. "Thermax" – Celotex Corporation
3. Fiberglass Batt Thermal Insulation
   a. Kraft-faced Batts: Fiber glass building insulation for walls, ceilings, attics and floors.
      1. Acceptable Manufacturer's:
         a. Celotex Corporation
         b. Certainteed Corporation
         c. Owens - Corning Fiberglass
   b. Thermal Resistance (R-Value) (ASTM C518): See Drawings for specified thickness and corresponding R-value.
   c. Thickness: See Drawings.
   d. Material Standard: ASTM C665, Type II, Class C, Category 1, faced on one side with Kraft paper providing a vapor barrier of 1.0 or less.
   e. Noncombustibility: ASTM E 136, passes.

4. Polypropylene-Faced Wide Roll Fiberglass Blanket Insulation.
   a. Same as fiberglass batt-type thermal insulation, except rolls shall be manufactured in 60”widths.
   b. 4” thick, R-13.
   c. Polypropylene Facing Material:
      1. Manufacturer’s standard white medium abuse-resistance.
      2. Permeance: 0.10.
      3. Flame Spread: 25 or less.
      4. Smoke-Developed: 50 or less.
   d. Acceptable Products and Manufacturers
      1. “Metal Building Insulation” – Guardian Building Products
      2. “Metal Building Insulation” - Johns-Manville
      3. “Certified R Metal Building Insulation” - Owens-Corning Fiberglass
5. Fiberglass Batt Acoustical Insulation
   a. Unfaced glass fiber acoustical insulation complying with ASTM C 665, Type 1, Class A rating.
      1. Acceptable Manufacturer's:
         a. Celotex Corporation
         b. Certainteed Corporation
         c. Owens - Corning Fiberglass
   b. Size shall be 3-1/2" thick x 16" wide.
   c. Fire Resistance Ratings: Passes ASTM E 119 Test.
   d. Sound Transmission Class: STC 50.
   e. Dimensional Stability: Linear Shrinkage less than 0.1%.
6. Miscellaneous Materials:
   a. Adhesive for bonding insulation: The type recommended by the insulation manufacturer and complying with fire-resistance requirements and insurance requirements.
   b. Mastic sealer: Type recommended by insulation manufacturer for bonding edge joints between units and filling voids in the work.

H. EXAMINATION
1. Site Verification of Conditions:
   a. Verify that site conditions are acceptable for installation of building insulation.
   b. Do not proceed with installation of building insulation until unacceptable conditions are corrected.
2. Do not proceed with the installation of insulation until subsequent work which conceals the insulation is ready to be performed, unless directed otherwise.

I. PREPARATION
1. Protection: Protect adjacent work areas and finish surfaces from damage during product installation.

J. INSTALLATION
1. General: Comply with insulation manufacturer's written instructions applicable to products and application indicated.
   a. Install insulation that is undamaged, dry and unsoiled and that has not been left exposed at any time to ice and snow.
   b. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.
   c. Water Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
   d. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
2. Installation of General Building Insulation:

a. Seal joints between closed-cell (non-breathing) insulation units by applying adhesive, mastic or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic or sealant as recommended by insulation manufacturer.
b. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
   1. Tape ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
c. Install glass-fiber blankets in cavities formed by framing members according to the following requirements:
   1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
d. Acoustical Insulation Installation: Install insulation where indicated in sound rated assemblies. Maintain acoustical rating of assembly.
e. Board Insulation Installation: Install insulation where indicated:
   1. Fasten board insulation to masonry in cavity as recommended by manufacturer.
f. Installation of Vapor Retarders:
   a. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
   b. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor retarder manufacturer.
   c. Seal joints caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape to create an airtight seal between penetrating objects and vapor retarder.
   d. Repair any tears or punctures in vapor retarders immediately before concealment by other work.

J. PROTECTION

1. Protect installed work from damage due to subsequent construction activity on the site, until completion of the project. Repair damage to installed products prior to installation of finish materials.

END OF SECTION 07 21 00

SECTION 07 21 19 - FOAMED-IN-PLACE MASONRY WALL INSULATION

A. SUMMARY

1. Extent of insulation work is shown on drawings and indicated by provisions of this section.
2. Applications of insulation specified in this section include the following:
   a. Foamed-In-Place masonry insulation for thermal, sound and fire resistance values.

B. SUBMITTALS

1. Manufacturer's specification sheets for foamed-in-place masonry wall insulation.
2. Certified Test Reports: With product data, submit copies of certified test reports showing compliance with specified performance values, including R-values, fire performance and sound abatement characteristics.
3. Material Safety Data Sheet: Submit Material Safety Data Sheet complying with OSHA Hazard Communication Standard, 29 CRF 1910 1200.

C. QUALITY ASSURANCE

1. Manufacturing Standards: Provide insulation produced by a single and approved manufacturer. The product must come from the manufacturer pre-mixed to ensure consistency.
2. Installer Qualifications for Foamed-In-Place Masonry Insulation: Engage an experienced dealer/applicator who has been trained and licensed by the product manufacturer.
3. Fire Performance Characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by a testing agency acceptable to authorities having jurisdiction.
4. Product must be classified by Underwriters Laboratory (UL), in compliance with the following Surface Burning Characteristics:
   a. Fire Resistance Ratings: ASTM E-119
   b. Surface Burning Characteristics: ASTM E-84
   c. Combustion Characteristics: ASTM E-136

D. ACCEPTABLE MANUFACTURERS

1. Subject to compliance with requirements, provide products from one of the following:
   a. Thermco Thermal Corporation of America
   b. C.P. Chemical Co., Inc.
   c. Approved Equal.

E. INSULATING MATERIALS

1. General: Provide insulating materials which comply with requirements indicated for materials, compliance with referenced standards, and other characteristics.
2. Foamed-In-Place Masonry Insulation: Two component thermal insulation produced by combining a plastic resin and catalyst foaming agent surfactant which, when properly ratioed and mixed, together with compressed air produce a cold-setting foam insulation in the hollow cores of hollow unit masonry walls.
   a. Surface Burning Characteristics: Maximum flame spread, smoke developed and fuel contributed of 5, 50-100, and 0 respectively.
   c. Combustion Characteristics: Must be noncombustible, Class A building material. A Class A building material must have a flame spread rating of 25 or less.
   d. Thermal Values: "R" Value of 4.7/ inch @ 35 degrees F mean; ASTM C-177.
   e. Sound Abatement: Minimum Sound Transmission Class ("STC") rating of 54 for 12" CMU and 52 for 8" CMU.

F. INSPECTION AND PREPARATION

1. Application Assemblies: 6", 8", 10" or 12" concrete masonry units

G. INSTALLATION OF FOAMED-IN-PLACE INSULATION

1. General: Install foamed-in-place insulation from interior, or as specified, prior to installation of interior finish work and after all masonry and structural concrete work is in place; comply with manufacturer's instructions.
2. Examination: Examine walls and cavitis to determine whetehr there are conditions that would adversly affect the performance of the insulation. The walls to be insulated must be free of moisture both inside and outside of the block. Insulation is not to be injected into wet walls.
3. Installation: Fill all open cells and voids in hollow concrete masonry walls where shown on drawings. The foam insulation shall be pressure injected through a series of 5/8" to 7/8" holes drilled into every vertical column of block cells (every 8" on center) beginning at an approximate height of four (4) feet from finished floor level. Repeat this procedure at an approximate height of ten (10) feet above the first horizontal row of holes (or as needed) until the void is completely filled. Patch holes with mortar and score to resemble existing surface.
4. Sampling: Verify insulation density by random sampling. One cubic foot of fresh foam shall weigh between 2 lbs.8oz. and 3 lbs.6oz.
5. Painting: Allow two weeks after foam installation before painting masonry walls.

END OF SECTION 07 21 19

SECTION 07 22 16 – ROOF DECK INSULATION

A. SUMMARY OF WORK

1. Furnish and installed tapered (where required) polyisocyanurate insulation as indicated on the drawings and as specified herein. Include crickets where required.

B. RELATED SECTIONS

1. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specification Sections apply to this section.
2. Related work specified elsewhere:
   a. Section 05 31 13 – Steel Deck
   b. Section 06 10 00 – Rough Carpentry
   c. Section 07 53 23 – EPDM Roof System

C. REFERENCES

1.	ASTM A-653	Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process
2.	ASTM C-165-95	Test Method for Measuring Compressive Properties of Thermal Insulation
3.	ASTM C-209-92	Test Method for Cellulosic Fiber Insulating Board
4.	ASTM C-272-91	Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
5.	ASTM C-518-91	Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
6.	ASTM C 1289	Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.
7.	ASTM D-5	Test Method for Penetration of Bituminous Materials
8.	ASTM D-36	Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
9.	ASTM D-312	Specification for Asphalt Used in Roofing
10.	ASTM D-2178	Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing
11.	ASTM D-5147	Sampling and Testing Modified Bituminous Sheet Material
12.	ASTM E 108	Standard Test Methods for Fire Tests of Roof Coverings
13.	ASTM E 119	Standard Test Methods for Fire Tests of Building Construction and Materials.
14.	ASTM E 2114-01	Standard Terminology for Sustainability Relative to the Performance of Buildings
15.	ASTM E 2129 –01	Standard Practice for Data Collection for Sustainability Assessment of Building Products.
16.	FM 4450	Approval Standard - Class I Insulated Steel Roof Decks
17.	FM 4470	Approval Standard - Class I Roof Covers.
18.	NRCA	National Roofing Contractors Association, Chicago, IL
19.	SDI	Steel Deck Institute, St. Louis, Missouri
20.	UL 263	Fire Tests of Building Construction and Materials
21.	UL 790	Standard Test Methods for Fire Tests of Roof Coverings
22.	UL 1256	Fire Test of Roof Deck Constructions.
23.	LTTR	Long Term Thermal Resistance predicted by CAN/ULC-S770-03.

D. DEFINITIONS

1. LTTR (Long Term Thermal Resistance) is defined as using techniques from ASTM C1303 or CAN/ULC-S770, the predicted R-Value that has been shown to be equivalent to the average performance of a permeably faced foam insulation product over 15 years. LTTR applies to ALL foam

insulation products with blowing agents other than air, such as polyiso, extruded polystyrene and polyurethane. The new method is based on consensus standards in the US and Canada.

E. SUBMITTALS
1. Submit under provisions of Section 01 30 00 – Submittal Procedures.
2. Product Data: Provide manufacturer's specification data sheets for each product in accordance with Section 01 30 00.
3. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
4. Samples:
   a. Submit 6 by 6 inch (152 by 152 mm) samples of each board type required.
   b. Submit samples of each fastener type required.
5. Shop Drawings: Roof plan showing layout of boards and fastening patterns.
6. Installation instructions for insulation board and fasteners.

F. SHOP DRAWINGS
1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.
2. Shop drawing shall include: Outline of roof, location of drains, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

G. CERTIFICATION
1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable.
2. Submit roof manufacturer's certification that insulation furnished is acceptable, as a component of roofing system and is eligible for roof manufacturer's system warranty.
3. Submit certification that insulation and fastening system furnished is Tested and Approved by Factory Mutual for 1-90 Wind Up-Lift Requirements.

H. QUALITY ASSURANCE
1. Fire Classification, ASTM E-108
2. Submit certification that the roof system furnished is approved by Factory Mutual, Underwriters Laboratories or Warnock Hersey for external Fire E-108 Class 1A and that the roof system is adhered properly to meet or exceed 1-90.

I. DELIVERY, STORAGE AND HANDLING
1. Deliver products with seals and labels intact, in manufacturer's original containers, dry and undamaged.
2. Store all insulation materials protected from the wind, sun and moisture damage prior to and during installation. Any insulation that has been exposed to moisture shall be removed from the project site.
3. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
4. Store materials off the ground. Any warped, broken or wet insulation boards shall be discarded.

J. INSULATION MATERIALS
1. Closed-cell polyisocyanurate foam core manufactured using blowing agent and integrally laminated to heavy non-asphaltic fiber-reinforced felt facers.
2. Provide thicknesses of insulation as indicated, provide combination of types and thicknesses to provide a complete system.

K. POLYISOCYANURATE ROOF INSULATION

1. Flat or Factory Tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
2. Insulation: R-25
   a. Insulation shall be installed in multiple layers (4-1/2" total thickness). The first and second layer of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.
3. See drawings for locations requiring tapered.
   a. Taper Thickness: Minimum ½ in. at low points.
   b. Tapered Slope: ¼ in. per foot.
   c. Average R-Value: Minimum 10.00
4. Insulation board shall meet the following requirements:
   a. UL, WH or FM listed under Roofing Systems
5. Physical Properties:

a. Dimensional Stability	ASTM D-2126	2% max.
b. Compressive Strength	ASTM D-1621	25 psi min.
c. Vapor Permeability	ASTM E-96	1 perm max.
d. Foam Core Density	ASTM D-1622	2.0 pcf min.
e. Water Absorption	ASTM C-209	<1%
f. R-Factor HR per inch Thickness	ASTM C-518	5.6 (Design Value)

L. RELATED MATERIALS

1. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated, matching insulation board.
2. Roof Board Joint Tape: 6" wide glass fiber mat with adhesive compatible with insulation board facers.
3. Asphalt: ASTM D-312, Type IV Steep Asphalt.
4. Fasteners:
   a. Corrosion resistant screw fastener as recommended by roof membrane manufacturer.
   b. Factory Mutual Tested and Approved with 3 in. coated disc for 1-90 rating, length required to penetrate metal deck one inch.
   c. Minimum pull out resistance of 800 lbs.

N. INSPECTION

1. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation.
2. Verify that work that penetrates roof deck has been completed.
3. Verify that wood nailers are properly and securely installed.
4. Examine surfaces for defects or irregularities that would prohibit timely and correct installation.
5. Do not proceed until defects are corrected.
6. Do not apply insulation until substrate is sufficiently dry.
7. Broom clean substrate immediately prior to application.
8. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.

O. INSTALLATION

1. Attachment with Mechanical Fasteners
   a. Install base course of 1" thickness polyisocyanurate insulation; and, subsequent courses of the same insulation to incorporate a ¼" per foot slope to drain. All polyisocyanurate insulation shall be fully attached to the deck with an approved mechanical fastening system, in accordance with manufacturer's recommendation for FM 1-90 approved system.
   b. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.

c. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches, and a maximum of six inches.
d. Minimum penetration into deck shall be as recommended by the fastener manufacturer.

P. CLEANING AND PROTECTION

1. Remove trash and construction debris from insulation surface prior to application of roofing membrane.
2. Do not leave installed insulation exposed to weather. Cover and waterproof with completed roof system immediately after installation.
   a. Temporarily seal exposed insulation edges at the end of each day.
   b. Remove and replace installed insulation that has become wet or damaged with new insulation.
3. Protect installed insulation and roof cover from traffic by use of protective covering materials during and after installation.

END OF SECTION 07 22 16

SECTION 07 40 00 – METAL WALL PANELS

A. SCOPE OF WORK

1. Furnish all labor, material, tools and equipment necessary to furnish and install exterior metal wall panels, interior metal liner panels, and accessories, in accordance with manufacturer's specifications and all applicable Drawings.

B. RELATED SECTIONS

1. Section 05210 – Steel Joists
2. Section 05310 – Steel Deck
3. Section 05400 – Cold-Formed Metal Framing
4. Section 07200 - Insulation
5. Section 07600 – Flashing & Sheet Metal

C. STANDARDS

1. American Society for Testing Materials (ASTM)
2. Ohio Building Code (OBC)
3. Underwriter's Laboratories (UL)
4. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

D. SUBMITTALS

1. Submit shop drawings to clearly show all layers, dimensions, fasteners and accessories of fabricated work, per Division 1.
2. Submit with the shop drawings copies of performance data on panels, anchor clips and all accessories.

E. DELIVERY, STORAGE AND HANDLING

1. Deliver materials in manufacturer's unopened, labeled containers. Store materials to avoid damage. Comply with manufacturer's recommendations for job-site storage and protection.

F. PRODUCTS

1. Metal Wall Panels and Liner Panels
   a. Metal wall panels shall be "Una-Clad UR-Pro Omega", as manufactured by Firestone Building Products, or approved equal.
      1. System shall be installed directly on CMU or structural steel frame as indicated on the drawings.
   b. Panels shall be 24-Gauge Galvanized Steel, Pre-finished High Performance Kynar 500 Finish.
   c. Panel width shall be 36".
   d. Performance:
      1. UL 90 rating.
      2. ASTM E283 Air Infiltration Testing.
      3. ASTM E331 Water Penetration Testing.
      4. ASTM E330-90 Structural Performance Testing.
   e. Fasteners and accessories shall be provided by manufacturer as required.
   f. Color shall be selected by Architect from manufacturer's full range of colors.
   g. Acceptable Manufacturers
      1. Berridge Manufacturing Company
      2. Firestone Building Products
      3. Dimensional Metals, Inc.
      4. Petersen Aluminum Corporation
      5. Metal Sales Manufacturing Corporation

G. JOB CONDITIONS:
1. Proceed with metal wall panel installation only when all substrate work has been completed, substrate is dry and weather conditions are favorable.

H. INSTALLATION:
1. General: Comply with published recommendations of metal roof manufacturer details and recommendations of NRCA and SMACNA architectural sheet metal manual for installation.
2. Panels shall be installed so that the horizontal lines are level, and vertical lines are even.
3. Coordinate work with other trades and contractors.

I. TOUCH UP
1. Only minor scratches and abrasions shall be touched up. Any other damaged materials shall be replaced.

END OF SECTION 07 40 00

SECTION 07 53 23 – EPDM ROOFING SYSTEM

A. SUMMARY

1. Description
   a. The project consists of installing Fully Adhered EPDM Roofing System in conjunction with rigid roof insulation over new steel roof deck.
2. Extent of Work
   a. Provide all labor, material, tools, equipment, and supervision necessary to complete the installation of a 60-mil thick reinforced EPDM membrane Fully Adhered Roofing System including flashings and insulation as specified herein and as indicated on the drawings in accordance with the manufacturer's most current specifications and details.
   b. The roofing contractor shall be fully knowledgeable of all requirements of the contract documents and shall make themselves aware of all job site conditions that will affect their work.
   c. The roofing contractor shall confirm all given information and advise the Architect, prior to commencement of Work, of any conflicts that will affect their installation and weatherproof life of the roof.
   d. Any contractor who intends to submit a bid using a roofing system other than the approved manufacturer must submit for pre-qualification in writing ten (10) days prior to the bid date. Any contractor who fails to submit all information as requested will be subject to rejection.

B. RELATED WORK

1. The following listed work is included under other sections:
   a. Section 06 10 00 – Rough Carpentry
   b. Section 07 22 16 – Roof Insulation
   c. Section 07 92 00 – Joint Sealers

C. REFERENCES

1. American Society for Testing and Materials (ASTM)
2. Federal Specifications (FS)

D. SUBMITTALS

1. Shop Drawings: Submit drawing indicating roof size, location and type of penetrations, perimeter and penetration details, expansion joint details, roof insulation make-up and layout that have been accepted by an authorized manufacturer's representative.
2. Sample of the manufacturer's Membrane System Warranty.
3. Submit a letter of certification from the manufacturer which certifies the roofing contractor is authorized to install the manufacturer's roofing system and lists foremen who have received training from the manufacturer along with the dates training was received.
4. Upon completion of the installed work, submit copies of the manufacturer's final inspection to the specifier prior to the issuance of the manufacturer's warranty.

E. PRODUCT DELIVERY, STORAGE AND HANDLING

1. Deliver materials to the job site in the manufacturer's original, unopened containers or wrappings with the manufacturer's name, brand name and installation instructions intact and legible. Deliver in sufficient quantity to permit work to continue without interruption.
2. Comply with the manufacturer's written instructions for proper material storage.
   a. Store materials between 60 deg. F and 80 deg. F in dry areas protected from water and direct sunlight. If exposed to lower temperature, restore to 60 deg. F minimum temperature before using.
   b. Store materials containing solvents in dry, well ventilated spaces with proper fire and safety precautions.

Keep lids on tight. Use before expiration of their shelf life.

3. Insulation must be on pallets, off the ground and tightly covered with waterproof materials. Manufacturer's wrap does not provide sufficient waterproofing.
4. Any materials which are found to be damaged shall be removed and replaced at the applicator's expense.

F. WORK SEQUENCE

1. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.

G. PRE-INSTALLATION CONFERENCE

1. A pre-installation meeting shall be held at the job site, minimum of one (1) week prior to start of roof system installation. The roofing contractor shall observe actual conditions and verify all dimensions on the roof.
2. Any conditions which are not shown on the shop drawings should be indicated on a copy of the shop drawing and included with bid submittal if necessary to clarify any conditions not shown.

H. JOB SITE PROTECTION

1. The roofing contractor shall adequately protect building, paved areas, service drives, lawn, shrubs, trees, etc. from damage while performing the required work. Provide canvas, boards and sheet metal (properly secured) as necessary for protection and remove protection material at completion. The contractor shall repair or be responsible for costs to repair all property damaged during the roofing application.
2. During the roofing contractor's performance of the work, care shall be taken to prevent the spread of dust and debris, particularly where such material may sift into the building. The roofing contractor shall provide labor and materials to construct, maintain and remove necessary temporary enclosures to prevent dust or debris in the construction area(s) from entering the remainder of the building.
3. Do not overload any portion of the building, either by use of or placement of equipment, storage of debris, or storage of materials.
4. Protect against fire and flame spread. Maintain proper and adequate fire extinguishers.
5. Take precautions to prevent drains from clogging during the roofing application. Remove debris at the completion of each day's work and clean drains, if required. At completion, test drains to ensure the system is free running and drains are watertight. Remove strainers and plug drains in areas where work is in progress. Install flags or other telltales on plugs. Remove plugs each night and screen drain.
6. Store moisture susceptible materials above ground and protect with waterproof coverings.
7. Remove all evidence of piled bulk materials and return the job site to its original condition upon completion of the work.

I. SAFETY

1. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state and federal requirements that are safety related. Safety shall be the responsibility of the roofing contractor. All related personnel shall be instructed daily to be mindful of the full time requirement to maintain a safe environment throughout the entire Project Site.

J. WORKMANSHIP

1. Applicators installing new roof, flashing and related work shall be factory trained and approved by the manufacturer they are representing.
2. All work shall be of highest quality and in strict accordance with the manufacturer's published specifications and to the building owner's satisfaction.
3. There shall be a supervisor on the job site at all times while work is in progress.

K. QUALITY ASSURANCE

1. The EPDM membrane roofing system must achieve a UL Class C and must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Code (ASCE-7) or ANSI/SPRI WD-1.
2. The manufacturer must have a minimum of 20 years experience in the manufacturing of vulcanized thermal set sheeting.
3. Unless otherwise noted in this specification, the roofing contractor must strictly comply with the manufacturer's current specifications and details.
4. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least five (5) years successful experience installing single-ply EPDM roofing systems and having installed at least one (1) roofing application or several similar systems of equal or greater size within one year.
5. Provide adequate number of experienced workmen regularly engaged in this type of work who are skilled in the application techniques of the materials specified. Provide at least one thoroughly trained and experienced superintendent on the job at all times roofing work is in progress.
6. There shall be no deviations made from this specification or the approved shop drawings without the prior written approval of the Architect. Any deviation from the manufacturer's installation procedures must be supported by a written certification on the manufacturer's letterhead and presented for the specifier's consideration.
7. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the Architect seventy-two (72) hours prior to the manufacturer's final inspection.

L. JOB CONDITIONS, CAUTIONS AND WARNINGS

1. Material Safety Data Sheets (MSDS) must be on location at all times during the transportation, storage and application of materials.
2. When positioning membrane sheets, exercise care to locate all field splices away from low spots and out of drain sumps. All field splices should be shingled to prevent bucking of water.
3. When loading materials onto the roof, the manufacturer's authorized Roofing Applicator must take all necessary care to prevent overloading and possible disturbance to the building structure.
4. Proceed with roofing work only when weather conditions are in compliance with the manufacturer's recommended limitations, and when conditions will permit the work to proceed in accordance with the manufacturer's requirements and recommendations.
5. Proceed with work so new roofing materials are not subject to construction traffic. When necessary, new roof sections shall be protected and inspected upon completion for possible damage.
6. Provide protection, such as 3/4 inch thick plywood, for all roof areas exposed to traffic during construction. Plywood must be smooth and free of fasteners and splinters.
7. The surface on which the insulation or roofing membrane is to be applied shall be clean, smooth, dry, and free of projections or contaminants that would prevent proper application of or be incompatible with the new installation, such as fins, sharp edges, foreign materials, oil and grease.
8. New roofing shall be complete and weathertight at the end of the work day.
9. Contaminants such as grease, fats and oils shall not be allowed to come in direct contact with the roofing membrane.

M. WARRANTY

1. Provide and execute, upon final acceptance by manufacturer, a twenty (20) year Manufacturer's Standard Total Systems Warranty.

N. PRODUCTS

1. General
   a. Unless otherwise approved by the specifier and accepted by the membrane manufacturer, all products (including insulation, fasteners, fastening plates and edgings) must be manufactured and supplied by the roofing system manufacturer and covered by the warranty.
2. Acceptable manufacturers:
   a. Carlisle
   b. Firestone
   c. Johns Manville
   d. Versico
3. Membrane
   a. Furnish 60-mil thick Reinforced EPDM (Ethylene, Propylene, Diene Terpolymer) in the largest sheet possible. The membrane shall conform to the minimum physical properties of ASTM D4637. When a 10 foot wide membrane is to be used, the membrane shall be manufactured in a single panel with no factory splices to reduce splice intersections.
4. Insulation/Underlayment
   a. When applicable, insulation shall be installed in multiple layers. The first and second layer of insulation shall be mechanically fastened to the substrate in accordance with the manufacturer's published specifications.
   b. Insulation shall be factory tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber matt faces. See drawings for thickness and corresponding R-Value.
5. Adhesives, Cleaners and Sealants
   a. Furnish and install all manufacturer's recommended products, specifically formulated for the intended purpose.
6. Fasteners and Plates
   a. Furnish and install all manufacturer's recommended products, specifically intended purpose for proper mechanical attachment of insulation and membrane.
7. Metal Edging and Membrane Terminations
   a. Parapet Locations: Manufacturer's standard system for termination as indicated; and, coping system consisting corrosion resistant fasteners and 0.040" aluminum snap-on coping cover. Metal coping color shall be as selected by Architect.
   b. Roof Edge Locations: metal fascia/edge system with a 22 gauge continuous anchor cleat and .032 inch thick aluminum fascia. Metal edge/fascia color shall be as selected by Architect.
8. Expansion Joints
   a. Manufacturer's standard details and materials for type and size of expansion joints.
9. Walkways
   a. Protective surfacing for roof traffic shall be manufacturer's standard pressure-sensitive walkway pads (with factory-applied tape on the underside of the walkway) adhered to the membrane surface in conjunction with primer.

O. INSTALLATION

1. General
   a. Comply with the manufacturer's published instructions for the installation of the membrane roofing system including proper substrate preparation, jobsite considerations and weather restrictions.
   b. Position sheets to accommodate contours of the roof deck and shingle splices to avoid bucking water.
2. Insulation Placement
   a. Install insulation or membrane underlayment over the substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch. Stagger joints both horizontally and vertically if multiple layers

are provided.

b. Secure insulation to the substrate with the required mechanical fasteners in accordance with the manufacturer's specifications.

3. Membrane Placement and Bonding
   a. Unroll and position membrane without stretching. Allow the membrane to relax for approximately 1/2 hour before bonding. Fold the sheet back onto itself so half the underside of the membrane is exposed.
   b. Apply the Bonding Adhesive in accordance with the manufacturer's published instructions, to both the underside of the membrane and the substrate. Allow the adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
      1. Roll the coated membrane into the coated substrate while avoiding wrinkles. Brush down the bonded half of the membrane sheet with a soft bristle push broom to achieve maximum contact.
      2. Fold back the unbonded half of the membrane sheet and repeat the bonding procedure.
   c. Install adjoining membrane sheets in the same manner, overlapping edges approximately 4 inches. Do not apply bonding adhesive to the splice area.
4. Membrane Splicing with Splicing Cement
   a. Adhesive splices must be a minimum of 3" wide. Field splices at roof drains must be located outside drain sump.
   b. Fold the top sheet back and clean the dry splice area (minimum 3" wide) of both membrane sheets by scrubbing with clean natural fiber rags saturated with membrane cleaner or primer.
   c. Apply Splicing Cement and In-Seam Sealant in accordance with the manufacturer's specifications and roll the top sheet onto the mating surface.
   d. Roll the splice with a 2 inch wide steel roller and wait at least 2 hours before applying lap sealant to the splice edge following the manufacturer's requirements.
   e. Field splices without in-seam sealant must be overlaid with uncured flashing.
5. Flashing
   a. Wall and curb flashing shall be cured EPDM membrane. Continue the deck membrane as wall flashing where practicable.
   b. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
6. Expansion Joints
   a. Follow manufacturer's typical procedures for all expansion joints.
7. Walkways
   a. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the specifier's drawing.
   b. Adhere walkways pads to the EPDM membrane in accordance with the manufacturer's specifications.
8. Daily Seal
   a. When the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
   b. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.
9. Clean-up
   a. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.
   b. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.
10. Manufacturer's Field Service
    a. Upon completion of the roofing system, an authorized representative of the manufacturer will make an inspection of the installation prior to warranty issuance.

END OF SECTION 07 53 23

SECTION 07 60 00 – FLASHING & SHEET METAL

A. SUMMARY OF WORK

1. The work included in this section consists of furnishing all labor, material, tools and equipment necessary to furnish and install all sheet metal flashing and trim, including, but not limited to the following:
   a. Roof and Wall Flashings.
   b. Prefabricated Reglets and Counterflashings.
   d. Metal Fascias.
   e. Metal Soffits
   f. Metal Roof Edges.
   g. Trim and Break Metal.
   h. Gutters, Downspouts and Diverters.
   i. Sealants and bonding agents between components of this Section and between the roof and other materials.

B. STANDARDS

1. American Society for Testing Materials (ASTM)
2. Ohio Building Code (OBC)
3. Architectural Aluminum Manufacturer's Assoc. (AAMA)
4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

C. PERFORMANCE REQUIREMENTS

1. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, ratting, leaking, and fastener disengagement.
2. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   a. Temperature Change (Range): 120 degrees F., ambient; 180 degrees F., material surfaces.
3. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

D. SUBMITTALS

1. Product Data: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
2. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop and field assembled work. Include the following:
   a. Identify material, thickness, weight, and finish for each item and location in project.
   b. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   c. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
   d. Details of expansion joint covers, including showing direction of expansion and contraction.
3. Samples of Verification: For each type of exposed finish required, prepared on samples of size indicated below:
   a. 8 inch square samples of specified sheet materials to be exposed as finished surfaces.
   b. 12 inch long samples of factory fabricated products exposed as finish work. Provide complete with specified factory finish.
4. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major

counterflashing, trim/fascia units, gutters, downspouts, and expansion joint systems.

E. QUALITY ASSURANCE
1. Except as otherwise indicated, the workmanship of sheet metal work, method for forming joints, anchoring, cleating and provisions for expansion shall conform to the standard details and recommendations of the "Architectural Sheet Metal Manual" published by SMACNA; and workmanship shall be of the best quality, in accordance with best trade practice and the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc.
2. Installer/Fabricator Qualifications: Not less than five (5) years documented successful experience with work comparable to Work of this Project, approved and acceptable to roofing manufacturer.

F. DELIVERY, STORAGE AND HANDLING
1. Deliver materials in manufacturer's unopened, labeled containers. Store materials to avoid damage, and store rolled goods on end. Comply with manufacturer's recommendations for job-site storage and protection.

G. MANUFACTURERS
1. Standard Specified shall be Alcoa Building Products.

H. MATERIALS
1. The type and locations of the various kinds, gauges, thickness, and finish of sheet metal to be used is specified hereinafter under the individual items. Where sheet metal is indicated on Drawings and kind or type of metal is not definitely specified, aluminum shall be provided.
2. Aluminum Extrusions: Alloy and temper recommended by manufacturer for use intended and as required for proper application of finish indicated, but not less than the strength and durability properties specified in ASTM B221 for 6063-T5.
3. Aluminum Sheet: Alloy and temper recommended by manufacturer for use intended and as required for proper application of finish indicated, but with not less than the strength and durability properties specified in ASTM B209 for 5005-H15.

I. MISCELLANEOUS MATERIALS AND ACCESSORIES
1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashings and trim installation.
2. Fasteners: Same metal as flashing/sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened. Provide wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
   a. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
      1. Blind Fasteners: High-strength aluminum or stainless steel rivets.
3. Bituminous Coating: SSPC-Paint 12, solvent type bituminous mastic, nominally free of sulfur, compounded for 15 mil dry film thickness per coat.
4. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying, non-migrating sealant.
5. Elastomeric Sealant: Provide per recommendations of metal manufacturer.
6. Epoxy Seam Sealer: Two-Part non-corrosive metal seam cementing compound, recommended by metal manufacturer for exterior non moving joints.
7. Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
8. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.

J. PRODUCTS

1. Roof Flashings
   a. Through-wall Flashing.
   b. Counter Flashing.
   c. Base and Counter Flashing.
   d. Roof Penetration Flashing.
   e. Miscellaneous flashing as shown on the drawings or referenced in standard details recommended in SMACNA "Architectural Sheet Metal Manual".
2. Pre-finished Metal Flashing
   a. Flashing: .050 minimum thickness.
3. Prefabricated Reglets and Counterflashings:
   a. 24 gauge galvanized steel.
   b. Reglet shall have a 2 inch factory-formed end lap
   c. Flashing shall have a 3 inch end lap.
   d. Provide factory manufactured mitered and sealed corners.
   e. Provide sealant at time of installation. Refer to Specification Section 07 90 00 – Joint Sealants.
4. Metal Roof Edge
   a. Minimum .024" pre-finished, baked enamel, aluminum sheet, brake- formed to provide 3" roof deck flange, and 1-1/2" fascia flange with 3/8" drip at lower edge. Furnish in 8' or 10' lengths.
   b. Color shall be selected by Architect.
5. Aluminum Fascia and Trim Brake-Metal Sheet Material
   a. Minimum .050 extruded aluminum with Kynar 500 coating. Color as selected by Architect.
   b. Maximum two-part construction.
   c. Concealed aluminum joint covers.
   d. Anchor with stainless steel fasteners.
   e. Corners shall be factory mitered and welded.
6. Gutters and Downspouts
   a. General: Provide prefinished gutters, downspouts, diverters, flashing and accessories in shapes and sizes indicated, with mitered and welded corners. Include straps, hangers or other attachment devices; end plates; elbows; fittings; and trim and other accessories indicated or required for complete installation. Fabricate gutters in 10 foot long sections minimum with 6 inch wide concealed splice plates.
   b. Continuous extruded sections in longest length possible. Lengths greater than 50' shall be provided with expansion joints.
   c. Gutters: 0.032, 6" OG type.
   d. Downspouts: 0.032, 3" x 4".
   e. Furnish all hangers, end caps, elbows, headers, clips, boots, and associated accessories.
   f. Splash Guards: Manufacturer's standard pre-finished metal splash-guards at all interior and exterior corners of gutters. Splash-guards shall match gutters, as selected by Architect.
   g. Color shall be selected by Architect.
   h. Accessories
      1. Gutter Straps and Brackets
         a. 3/16 inch thick by 1 inch wide aluminum (up to 15 inch girth)
         b. Shop paint straps and brackets to match gutters.
      2. Downspout Hangers: 1/8 inch thick by 1 inch wide of same material and finish as downspout.
      3. Stainless Steel Wire Strainer: 14 gauge, removable basket type strainer per SMACNA Fig. 1-24D.
      4. Expansion Joints: Provide where indicated but not more than 50 feet on center maximum. Comply with SMACNA recommendations.

K. FINISHES

1. General: Apply coatings either before or after forming and fabricating panels, as required by coating process and as required for maximum coating performance capability. Protect coating either by application of

strippable film or by packing plastic film or other suitable material between panels in a manner to properly protect the finish. Furnish air drying spray finish in matching color for touch-up.

2. High Performance Coating: AA-C12C42R1x. Apply in strict compliance with coating and resin manufacturer's instructions using a licensed applicator.
   a. Fluoropolymer Coating: Manufacturer's standard two-coat, thermocured, full strength 70 percent "Kynar 500" coating consisting of a primer and a minimum of 0.75 mil dry film thickness with a total minimum dry film thickness of 0.9 mil and 30 percent reflective gloss when tested in accordance with ASTM D523.

L. FABRICATION

1. General: Shop fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, fin edges to be seamed, form seams and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
3. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
4. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
5. Separations: Provide for separation of metal from non-compatible metal or corrosive substrates by coating or other permanent separation as recommended by manufacturer/fabricator.

M. WARRANTY

1. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace manufactured roof specialties that show evidence of deterioration of factory applied finishes within specified warranty period.
   a. Fluoropolymer Finish: Deterioration includes, but is not limited to toe following:
      1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 10 year from date of Substantial Completion.

N. EXAMINATION

1. General: The installer must examine substrates and conditions under which metal flashings will be installed, and notify Contractor in writing of unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

O. PREPARATION

1. Separate dissimilar metals from each other by painting each metal surface in area of contact with a heavy application of bituminous coating.

P. INSTALLATION:

1. General: Comply with published recommendations of sheet metal manufacturer details and

recommendations of SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams that will be permanently watertight and weatherproof.

2. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
3. Bituminous Coating: SSPC – Paint 12, solvent type bituminous mastic, nominally free of sulfur. Compounded for 15-mil dry film thickness per coat.
4. Prefabricated reglets and counterflashings shall be installed in accordance with manufacturer's printed instructions. Coordinate reglets with work by others.
5. Roofing Expansion Joints: Installation shall be in accordance with the manufacturer's written instructions and as indicated.
6. Prefabricated Fascia
   a. Install as recommended by manufacturer and as indicated.
   b. Fasten with non-corrosive, non-rusting fasteners.
   c. Cover joints with strips of same material, screwed and caulked in place with appropriate sealant of matching color.
7. Gutters and Downspouts: Refer to SMACNA for Hanging Gutter instructions – Bracket Support
   a. For nonmoving seams, clean edges and lap seams one inch. Seal seams with epoxy seam sealer and rivet on 2 inch centers. Provide expansion joints between downspouts.
   b. Install gutter straps and brackets at 36 inches on center, alternating strap and bracket.
   c. Provide pre-manufactured outlet tube sections extending 3 inches into downspouts. Provide in each outlet tube a wire strainer of the removable basket type. Fit strainer snugly into outlets.
   d. Fasten downspouts to walls with straps and secure with noncorrosive screws in plastic sleeves. Extend downspouts into drains and seal in accordance with manufacturer's recommendations.
8. Flashing at Roof Penetrations (Miscellaneous)
   a. Work under this Section shall include the flashing of roof penetrations not otherwise specified under other Sections.
   b. Flashing of roof penetrations not detailed shall be performed according to the recommendations and specifications of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), subject to approval by the Architect.

Q. <u>CLEANING AND PROTECTION</u>

1. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch-up damaged metal coatings.
2. Protection: Provide protective measures as required to ensure that work of this Section will be without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 60 00

SECTION 07 84 13 - FIRESTOPPING

A. SUMMARY

1. Through penetration firestops and smoke-stops for all fire-rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.
2. Membrane penetration protection for fire-rated walls.
3. Architectural/Construction joint firestops within walls, floors, or the intersection of floors to exterior walls, or the intersection of top of walls to ceilings.
4. Top of wall firestopping in all fire-rated partitions.
5. Top of wall and construction joint smoke-stopping in all smoke partitions.

B. RELATED WORK

1. Proper execution of this work will maintain the hourly ratings of the walls and floors and ensure progress of work in other Sections. Coordinate work of this Section with the work of the following Sections:
   a. Cast In Place Concrete
   b. Unit Masonry
   c. Joint Sealers
   d. Gypsum Board
   e. Fire Suppression and Supervisory Systems
   h. Basic Mechanical Materials & Methods
   i. Mechanical Insulation
   j. Fire Protection
   k. Plumbing
   l. Basic Electrical Materials & Methods

C. REFERENCES

1. American Society For Testing and Materials Standards (ASTM):
   a. ASTM E84: Standard Test Method For Surface Burning Characteristics of Building Materials
   b. ASTM E814: Standard Test method For Fire Tests of Through-Penetration Firestops
2. Underwriters Laboratories Inc.:
   a. UL 723 Surface Burning Characteristics of Building Materials
   b. UL 1479 Fire Tests of Through-Penetration Firestops
3. UL Fire Resistance Directory:
   a. Through Penetration Firestop Devices (XHJI)
   b. Fire Resistive Ratings (BXUV)
   c. Through Penetration Firestop Systems (XHEZ)
   d. Fill, Void, or Cavity Material (XHHW)

D. SUBMITTALS

1. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data. Submittal should be in compliance with Section 01300.
2. Material Safety Data Sheets (MSDS): Submit MSDS for each firestop product.
3. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.
4. Submit manufacturer's installation procedures for each type of product.
5. Approved Applicator: Submit document from manufacturer wherein manufacturer recognizes the installer as qualified or submit a list of past projects to demonstrate capability to perform intended work.

E. QUALITY ASSURANCE

1. Firestopping systems (materials and design):

a. Shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire tests in a configuration that is representative of field conditions.
b. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
c. For joints, must be tested to UL 2079 with movement capabilities equal to those of the anticipated conditions.

2. Firestopping materials & systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical & mechanical duct work).
3. Firestopping material shall be asbestos and lead free and shall not incorporate nor require the use of hazardous solvents.
4. Firestopping sealants must be flexible, allowing for normal pipe movement.
5. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
6. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).
8. Installation of firestopping systems shall be performed by a contractor (or contractors) trained or approved by the firestop manufacturer.
9. Material used shall be in accordance with the manufacturer's written installation instructions.

F. PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Deliver material in the manufacturer's original, unopened containers or packages with the manufacturer's name, product identification, lot number, UL label, and mixing and installation instructions as applicable.
2. Store materials in the original, unopened containers or packages, and under conditions recommended by the manufacturer.
3. All firestop materials shall be installed prior to expiration of shelf life.

G. PROJECT CONDITIONS

1. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
2. Verify the condition of the substrates before starting work.
3. Weather Conditions: Do not proceed with installation of firestop materials when temperatures fall outside the manufacturer's suggested limits.
4. Care should be taken to ensure that firestopping materials are installed so as not to contaminate adjacent surfaces.

H. SEQUENCING

1. Schedule firestopping after installation of penetrants but prior to concealing the openings.
2. Firestopping shall precede gypsum board finishing.

I. PROTECTION

1. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

J. GENERAL

1. Firestopping materials and systems shall meet the requirements specified herein.
2. Architect must approve in writing any alternates to the materials and systems specified herein.

3. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.
4. For applications where combustible penetrants are involved, i.e. insulated and plastic pipe, a suitable intumescent material must be used.

K. ACCEPTABLE MANUFACTURERS
1. 3m Company
2. Hilti
3. Specified Technologies Inc.
4. United States Gypsum Co.

L. MATERIALS
1. Standard specified is that of Specified Technologies Inc.
   a. Intumescent Firestop Sealants and Caulks: SpecSeal SSS100
   b. Latex Firestop Sealant: SpecSeal LC150 Sealant
   c. Acrylic Water-Based Sealant: SpecSeal ES100 Elastomeric Sealant
   d. Silicone Firestop Sealants and Caulks: SpecSeal Pensil 300
   e. Firestop Putty: SpecSeal SSP100 Firestop Putty Bars and Pads
   f. Firestop Collars: SpecSeal SSC Firestop Collars
   g. Wrap Strips: SpecSeal SSW Wrap Strip
   h. 2-Part Silicone Firestop Foam: SpecSeal Pensil 200
   i. Firestop Mortar: SpecSeal SSM Mortar
   j. Firestop Pillows: STI SpecSeal SSB Pillows
   k. Elastomeric Spray: SpecSeal AS Elastomeric Spray
   l. Accessories:
      1. Forming/Damming Materials: Mineral fiberboard or other type as per manufacturer recommendation.

M. CONDITIONS REQUIRING FIRESTOPPING
1. General: Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safing, or otherwise.
2. Through-Penetrations: Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.
3. Membrane-Penetrations: Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third party time/temperature testing.
4. Construction Joints/Gaps: Firestopping shall be provided:
   a. between the edges of floor slabs and exterior walls
   b. between the tops of walls and the underside of floors
   c. in the control joint in masonry walls and floors
   d. in expansion joints
5. Smoke-Stopping: As required by the other Sections, Smoke-Stops shall be provided for Through-Penetrations, Membrane-Penetrations, and Construction Gaps with a material approved and tested for such application.

N. EXAMINATION
1. Examine the areas and conditions where firestops are to be installed and notify the architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by the contractor in a manner acceptable to the architect and in accordance with Section 01039.
2. Verify that environmental conditions are safe and suitable for installation of firestop products.

3. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

O. INSTALLATION
1. Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
4. Seal holes and penetrations to ensure an effective smoke seal.
5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.
6. Insulation types specified in other sections shall not be installed in lieu of firestopping material specified herein.
7. All combustible penetrants (e.g. non-metallic pipes or insulated metallic pipes) shall be firestopped using products and systems tested in a configuration representative of the field condition.

P. FIELD QUALITY CONTROL
1. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
2. Follow safety procedures recommended in the Material Safety Data Sheets.
3. Finish surfaces of firestopping which are to remain exposed in the completed work to a uniform and level condition.
4. All areas of work must be accessible until inspection by the applicable Code Authorities.
5. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification.

Q. CLEANING
1. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.
2. Leave finished work in neat, clean condition with no evidence of spill overs or damage to adjacent surfaces.

END OF SECTION 07 84 13

SECTION 07 92 13 - JOINT SEALERS

A. SCOPE OF WORK

1. Include all materials, labor and equipment necessary for the complete caulking and sealant work as specified, indicated on the drawings, or as otherwise necessary. Include, but not limited to all joints both interior and exterior, as follows:
   a. Joints in masonry walls.
   b. Perimeter door frames, door sills, windows and other openings.
   c. Building control joints.
   d. Windowsills
   e. Necessary locations of joints requiring weathertight sealant.
2. Drawings and general conditions and other Division 1 Specification Sections apply to this Section.

B. STANDARDS

1. American Society of Testing and Materials (ASTM).

C. PRODUCT HANDLING

1. Deliver, store and handle material in a manner to prevent the entrance of foreign materials and damage of materials by water or breakage. Damaged materials shall not be installed. The name of manufacturer and trade name of each caulking shall be on each container.

D. SUBMITTALS

1. Submit samples per the requirements outlined in Division 1.

E. QUALITY ASSURANCE

1. Applicator shall have a minimum of two (2) years experience and must be approved by the manufacturer.
2. Obtain elastomeric materials only from single manufacturer.

F. PROJECT CONDITIONS

1. Preparation of joint surfaces, backing, and the conditions under which the sealant and caulking is to be installed shall conform to manufacturer's recommendations.
2. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
   a. When ambient and substrate temperature conditions are outside the limits permitted by sealant manufacturer.
   b. When joint substrates are wet.
   c. Where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
   d. Contaminants capable of interfering with adhesion have not yet been removed from joint substrate.

F. WARRANTY

1. Provide manufacturer's two (2) year guarantee on materials.
2. Workmanship must be guaranteed against leakage for minimum of two (2) years from date of Owner's acceptance of the building.

G. MANUFACTURERS

1. Subject to the compliance with the requirements, provide products by one of the following:
   a. DAP, Inc.
   b. Dow Corning Corp.
   c. Hilti Construction Chemicals

d. General Electric Co., GE Silicones
e. Pecora Corp.
f. Sonneborn Building Products
g. Tremco, Inc.

H. MATERIALS

1. General
   a. Provide type, grade, class, hardness and similar characteristics of material as indicated or, where not indicated, to comply with manufacturer's recommendations relative to exposures, traffic, weather conditions and other factors of the joint system for best possible overall performance. Except as otherwise indicated, joint sealers are required to permanently maintain airtight and waterproof seals, without failures in joint movement accommodation, cohesion, adhesion (where applicable), migration, staining, and other performances as specified.
   b. Color shall be selected by Architect from manufacturer's full range of samples.
2. Caulking Compounds (Acrylic Latex Sealant)
   a. Latex rubber modified, acrylic emulsion polymer sealant compound; manufacturer's standard one-part, non-sag, mildew resistant, acrylic emulsion sealant complying with ASTM C 834, formulated to be paintable, and recommended for exposed applications on interior locations involving joint movement of not more than +/- 5%.
      1. Acceptable Products:
         a. Acrylic Latex Caulk with Silicone – DAP, Inc.
         b. AC-20 – Pecora Corp.
         c. Sonolac – Sonneborn Building Products.
         d. Acrylic Latex Caulk 834 – Sonneborn Building Products.
3. One-Part Elastomeric Sealant (Silicone)
   a. One component elastomeric sealant, complying with ASTM C 920, Class 25, Type NS (non-sag), unless Type S (self leveling) recommended by manufacturer for the application shown. Provide additional movement capability where indicated.
      1. Acceptable Products:
         a. Dow Corning 790 – Dow Corning Corp.
         b. Silpruf – GE
         c. Pecora 864 Architectural Silicone Sealant – Pecora Corp.
         d. Omniseal - Sonneborn Building Products.
         e. Spectrum 1 - Sonneborn Building Products.
   b. One component mildew resistant silicone sealant: (Around countertops, and backsplashes, and other locations subject to moisture and wet conditions.)
      1. Acceptable Products:
         a. Dow Corning 786 – Dow Corning Corp.
         b. Sanitary 1700 – GE
         c. Tremsil 600 – Tremco, Inc.
         d. 898 Silicone Sanitary Sealant – Pecora Corp.
4. Elastomeric Sealant (Polyurethane)
   a. One component polyurethane sealant complying with ASTM C 920, Type S, Grade NS, Class 25 (non-sag).
      1. Acceptable Products:
         a. Dynatrol I - Pecora Corp.
         b. Sonolastic NP 1 - Sonneborn Building Products.
         c. Dymonic or Vulkem 921 - Tremco, Inc.
   b. Two component polyurethane sealant complying with ASTM C 920, Type M, Grade NS, Class 25 (non-sag).
      1. Acceptable Products:

a. Dynatrol II - Pecora Corp.
b. Sonolastic NP 2 - Sonneborn Building Products.
c. Dymeric 511 or Vulkem 922 - Tremco, Inc.

5. One-Part Self-Leveling Polyurethane Sealant (for traffic areas)
   a. One component polyurethane self-leveling sealant, complying with ASTM C 920, Type S, Grade P, Class 25.
      1. Acceptable Products:
         a. NR-201 Urexpan - Pecora Corp.
         b. Sonolastic SL 1 - Sonneborn Building Products.
         c. Vulkem 45 - Tremco, Inc.
   b. Two component polyurethane self-leveling sealant, complying with ASTM C 920, Type M, Grade P, Class 25.
      1. Acceptable Products:
         a. NR-200 Urexpan - Pecora Corp.
         b. Sonolastic SL 2 - Sonneborn Building Products.
         c. Vulkem 245 or THC900/THC901 - Tremco, Inc.
6. Miscellaneous Materials:
   a. Provide joint cleaner and joint primer sealer as recommended by sealant or caulking compound manufacturer.
   b. Sealant backer rod shall be compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other similar material as recommended by the manufacturer.
      1. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
         a. Type C: Closed cell material with a surface skin.
      2. Where a 2 inch building expansion joint is indicated, provide an expanding foam secondary sealant, behind sealant, in lieu of backer rod.
   c. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates.
   d. Cleaners for Non-Porous Surfaces: Provide non-staining, chemical cleaners of type which are acceptable to manufacturers of sealant and sealant backing materials, and do not harm or affect substrates or adjacent materials.

I. EXAMINATION, PREPARATION AND INSTALLATION

1. Examine joints indicated and/or required to receive sealants, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint sealant performance. If unsuitable conditions are present, notify Architect of items requiring correction. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.
2. All surfaces must be clean, dry, and free from loose aggregate, paint, corrosion, oil, grease, wax, tar, or other impurities. Joints must not be contaminated with bituminous materials.
3. Prime joints, if required, apply back-up material and sealants in strict accordance with manufacturer's directions.
4. Joints with wrinkles, sags, poor adhesion, or improperly cured, shall be cut out and replaced without additional cost to the owner.

J. SELECTION OF MATERIAL

1. Caulking compounds shall be used for interior non-moving joints and at locations indicated, including, but not limited to:
   a. Perimeter joints of exterior openings, unless otherwise noted.
   b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.

   c. Interior control joints, unless otherwise indicated.
2. One component elastomeric silicone sealants shall be used at exterior and interior joints where thermal or dynamic movement is anticipated, including, but not limited to:
   a. Metal to metal joints.
   b. Sheet metal flashing, coping, pre-formed metal caps, fascia and trim.
   c. Glass to metal joints.
   d. Exterior insulation and finish system. Provide at joints within system, and at joints where system abuts other materials.
3. One component mildew resistant silicone sealant at locations indicated, including, but not limited to:
   a. Joints between plumbing fixtures and adjoining walls, floors and counters.
   b. Joints between countertops and backsplashes and walls.
4. One or two part elastomeric polyurethane sealants shall be used at exterior and interior joints where weatherproofing or waterproofing is required, and at exterior and interior joints between dissimilar materials including, but not limited to:
   a. Exterior and interior sides of building expansion joints.
   b. Exterior side of frame of doors, windows, and louvers to adjacent dissimilar materials.
   c. Lintels and shelf angles to masonry construction.
   d. Exterior building control joints and masonry expansion joints.
   e. Joints in concrete sitework (sidewalks, ramps, retaining walls, etc.), and the joint between concrete slabs and dissimilar materials.
   f. Sealant in pipe sleeves where materials perforate floor slab (non-rated).
   g. Perimeter of floor slabs and concrete curbs which abut vertical surfaces.
   h. Tile control and expansion interior joints in vertical and horizontal non-traffic surfaces.
   i. Exterior joints between dissimilar materials where the joining of two surfaces require a watertight seal.
5. One or two part self-leveling polyurethane sealant shall be used for exterior and interior horizontal joints subject to pedestrian and moderate vehicular traffic.

K. CLEANING
1. Clean off excess sealants or smears adjacent to joints as the work progresses, with materials recommended by joint sealer manufacturer.

L. PROTECTION
1. Protect joint sealants during and after curing period from contact with contaminating substrates and from damage resulting from construction operations, or other causes, for acceptance at time of substantial completion. If damage occurs, cut out and remove damaged or deteriorated joint sealants, immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 13

SECTION 08 12 13 - STEEL DOORS AND FRAMES

A. SUMMARY

1. Section Includes hollow metal steel doors and frames.

B. RELATED SECTIONS

1. Section 08 21 00 - Wood Doors
2. Section 08 70 00 - Door Hardware
3. Section 08 80 00 – Glazing
4. Section 09 90 00 – Painting

C. REFERENCES

1. ASTM - American Society for Testing and Materials
   a. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   b. ASTM A 924 - Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot Dip Process.
   c. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, High Strength Low-Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
   d. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
   e. ASTM E 413 - Classification for Rating Sound Insulation.
2. ANSI - American National Standards Institute
   a. ANSI/DHI A115 - Specifications for Hardware Preparations in Standard Steel Doors and Frames.
   b. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.
   c. ANSI A156.7 - Hinge Template Dimensions.
   d. ANSI A 250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.
   e. ANSI A250.4 – Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing.
   f. ANSI A 250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames.
   g. ANSI A 250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
   h. ANSI/SDI 250.11 - Recommended Erection Instructions for Steel Frames
3. SDI - Steel Door Institute
   a. SDI 105 - Recommended Erection Instructions for Steel frames.
   b. SDI 111 - Recommended Details and Guidelines for Standard Steel Doors and Frames and Accessories.
   c. SDI 112 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.
   d. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
   e. SDI 118 - Basic Fire Door Requirements.
   f. SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
   g. SDI 124 - Maintenance of Standard Steel Doors and Frames.
4. NAAMM/HMMA - Hollow Metal Manufacturers Association
   a. HMMA 840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames
   b. HMMA 820 TN01- Grouting Hollow Metal Frames
   c. HMMA 820 TN03 – Guidelines for Glazing of Hollow Metal Transom, Sidelight and Windows
5. Building Code references
   a. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
   b. NFPA 252 – Standard Method of Fire Tests of Door Assemblies

c. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies
d. UL 1784 - Air Leakage Tests of Door Assemblies
e. UL - Building Materials Directory; Underwriters Laboratories Inc
f. WH - Certification Listings; Warnock Hersey International Inc.

D. SUBMITTALS

1. Submit for review PDF files of the hollow metal shop drawings covering complete identification of items required for the project. Include manufacturer's names and identification of product. Included PDF files of catalog cuts and/or technical data sheets and other pertinent data as required to indicate compliance with these specifications.
2. Shop Drawings: submit complete and detailed with respect to quantities, dimensions, specified performance, and design criteria, materials and similar data to enable the Architect to review the information as required.
3. Indicate frames configuration, anchor types and spacing, location of cutouts for hardware, reinforcement, to ensure doors and frames are properly prepared and coordinated to receive hardware.
4. Indicate door elevations, internal reinforcement, closure method, and cutouts for glass lights and louvers.
5. Submit manufacturer's installation instructions, including a current copy of ANSI A250.11 as part of the shop drawing submittal.
6. Shop drawings, product data, and samples: stamp with Contractor's stamp verifying they have been coordinated and reviewed for completeness and compliance with the contract documents.
7. Shop drawings submitted without the above requirements will be considered incomplete, will NOT be reviewed, and will be returned directly to the Contractor.
8. Follow the same procedures for re-submittal as the initial submittal with the appropriate dates revised.
9. Provide evidence of manufacturer's membership in the Steel Door Institute.

E. QUALITY ASSURANCE

1. Select a qualified hollow metal distributor who is a direct account of the manufacturer of the products furnished. In addition, that distributor must have in their regular employment an Architectural Hardware Consultant (AHC), a Certified Door Consultant (CDC) or an Architectural Openings Consultant (AOC), who will be available to consult with the Architect and Contractor regarding matters affecting the door and frame opening.
2. Conform to requirements of the above reference standards. Submit test reports upon request by the Owner or Architect.
3. Underwriters' Laboratories and Intertek Testing Services / Warnock Hersey, labeled fire doors and frames:
   a. Label fire doors and frames listed in accordance with Underwriters Laboratories standard UL10C, and Positive Pressure Fire Tests of Door Assemblies.
   b. Construct and install doors and frames to comply with applicable issue of ANSI/NFPA 80.
   c. Manufacture Underwriters' Laboratories labeled doors and frames under the UL factory inspection program and in strict compliance to UL procedures, and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
   d. Manufacture Intertek Testing Services / Warnock Hersey labeled doors and frames under the ITS/WH factory inspection program and in strict compliance to ITS/WH procedures, and provide the degree of fire protection capability indicated by the opening class.
   e. Affixed physical label or approved marking to fire doors and/or fire door frames, at an authorized facility as evidence of compliance with procedures of the labeling agency. Labels to be metal, paper or plastic. Stamped or die cast labels are not permitted. Labels are not to be removed, defaced or made illegible while the door is in service as covered in NFPA Pamphlet 80.
   f. Conform to applicable codes for fire ratings. It is the intent of this specification that hardware and its application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.

4. Manufacturer Qualifications: Member of the Steel Door Institute.
5. Installer: Minimum five years documented experience installing products specified in this Section.

F. DELIVERY, STORAGE AND HANDLING

1. Storage of Doors
   a. Store doors vertically in a dry area, under proper cover. Place the units on at least 4" high wood sills on floors in a manner that will prevent rust and damage. Avoid storage in non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. If the door becomes wet, or moisture appears, remove protective wrapping immediately. Provide a 4" space between the doors to permit air circulation. Proper storage is required to meet the requirements of ANSI/SDI A250.11 and HMMA 840.
2. Storage of Frames
   a. Store frames in an upright position with heads uppermost under cover on 4" wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Store assembled frames in a vertical position, five units maximum in a stack. Provide a 2" space between frames to permit air circulation.
   b. Provide proper storage for doors and frames, to maintain the quality and integrity of the factory applied paint, and maintain the requirements of ANSI/SDI A250.10 and HMMA 840.
   c. Sand, touch up and clean prime painted surfaces prior to finish painting in accordance with the manufacturer's instructions.

G. COORDINATION

1. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
2. Coordinate work with frame opening construction, door and hardware installation.
3. Sequence installation to accommodate required door hardware.
4. Verify field dimensions for factory assembled frames prior to fabrication.

H. STANDARDS AND MANUFACTURERS

1. Standards: Comply with the requirements of Steel Door Institute, "Recommended Specifications for Standard Steel Doors and Frames," (SDI-100), and as herein specified.
2. Manufacturers: A recognized producer of hollow metal work complying with the requirements, including any one of the following:
   American Welding and Manufacturing Co.
   Ceco Corp.
   Fenestra
   Mesker Brothers Industries, Inc.
   Republic Steel Corp.
   Steelcraft Manufacturing Co.
   Virginia Metal Products

I. MATERIALS

1. DOORS:
   a. Construct exterior/interior doors to these designs and gages:
      1. Exterior Doors: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 18 gage Zinc-Iron Alloy-Coated galvannealed steel, with closed tops.
         a. Include galvannealed components and internal reinforcements with galvannealed doors.
         b. Close tops of exterior swing-out doors to eliminate moisture penetration. Galvannealed steel top caps are permitted.

2. Interior Doors: Cold-rolled steel, A 1008, 18 gage cold rolled or galvannealed steel.
   a. Include galvannealed components and internal reinforcements with galvannealed doors.
3. Factory prime painted doors indicated on door schedule as HM.
4. Hardware Reinforcements:
   a. Hinge reinforcements for full mortise hinges: minimum 7 gage.
   b. Lock reinforcements: minimum 16 gage.
   c. Closer reinforcements: minimum 14 gage, 20” long.
   d. Galvannealed doors: include galvannealed hardware reinforcements.
   e. Projection welded hinge and lock reinforcements to the edge of the door.
   f. Provided adequate reinforcements for other hardware as required.
5. Glass moldings and stops (both labeled and non-labeled doors):
   a. Fabricate glass trim from 24 gage steel conforming to:
      1. Interior openings ASTM designation A 366 cold rolled steel
      2. Exterior openings ASTM designation A 924 Zinc-Iron Alloy-Coated galvannealed steel with a zinc coating of 0.06 ounces per square foot (A60) for exterior openings.
   b. Install trim into the door as a four sided welded assembly with mitered, reinforced and welded corners.
   c. Trim: identical on both sides of the door.
   d. Exposed fasteners are not permitted. Labeled and non-labeled doors: use the same trim.
   e. Acceptable mounting methods:
      1. Fit into a formed area of the door face, not extending beyond the door face, and interlocking into the recessed area.
      2. Cap the cutout not extend more than 1/16” from the door face.

b. Full Flush Type Doors Construction
   1. ANSI-A250.4 criteria and tested to 5,000,000 operating cycles.
   2. Approved door core constructions:
      a. <u>Honeycomb</u>: Reinforced, stiffened, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels using contact adhesive applied to both panels and honeycomb core.
      b. <u>Polystyrene</u>: Reinforced, stiffened, sound deadened and insulated with a rigid polystyrene core bonded to the inside faces of both panels with contact adhesive. Fill voids around the perimeter of the door with honeycomb.
      c. <u>Steel Stiffened</u>: Vertically stiffened with steel stiffeners and sound deadened with fiberglass batt insulation. Fabricate hat shaped stiffeners from 20 gage. Locate vertical interior webs 6" apart, welded to the inside of the face sheets 5" on center. Weld the hat shape stiffeners together at the top and bottom of the door. Fill areas between stiffeners with fiberglass.
   3. Vertical edge seams: Provide doors with continuous vertical mechanical inter-locking joints at lock and hinge edges with visible edge seams, or a one piece full height 14 gage channel. Apply a continuous bead of structural epoxy in the internal vertical connection.
      a. Filled Vertical Edges (F): Continuous vertical mechanical interlocking joint with internal epoxy seal; edge seams epoxy filled and ground smooth.
   4. Bevel hinge and lock door edges 1/8 inch (3 mm) in 2 inches (50 mm). Square edges on hinge and/or lock stiles are not acceptable.
   5. Reinforce top and bottom of doors with galvannealed 14 gage, welded to both panels.

2. DOOR FRAMES:
   a. Construct exterior and metal door frames to these profiles, designs and gages;
      1. Exterior Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage Zinc-Iron Alloy-Coated galvannealed steel.
      2. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage galvannealed steel.

3. Interior Frames in stud wall construction: 16 gage cold rolled frames.
4. Include galvannealed components and internal reinforcements with galvannealed frames.

b. Flush Frames: knocked down for field assembly or set-up and welded with temporary shipping bars. Factory die-mitered corner connections reinforced with four integral tabs to secure and interlock at jambs to head. Unless otherwise indicated, frame will have 2" faces and 5/8" stops. Frame depths per the architectural door schedule.
   1. Provide frames with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design.
   2. Provide welded 3 sided frames as follows:
      a. Face welded: Weld miter joints between head and jamb faces completely along their length either internally or externally. The remaining elements of the frame profile (soffit, stop and rabbets) are not welded. Grind and finish face joints smooth.

c. Drywall Frames: same as flush frames, 16 gage except:
   1. Form frames with double return backbends to prevent cutting into drywall surface. Design knock down frames to be securely installed in the rough opening after wallboard is applied.
      a. Drywall frames: knocked down for field assembly. Factory die-mitered corner connections reinforced at miters, including soffit tabs to secure and interlock at jambs to head.
   2. Locate adjustable anchors in each jamb 4" from the top of the door opening to hold frame in rigid alignment.
      a. Provide security anchor at strike jambs on all frames 7´6" high and over.
   3. Base anchor: Weld-in base anchor attaching plate in each jamb for field installation of loose base anchors to allow proper anchoring at base of frame.

d. Prepare frames to receive inserted type door silencers (3) per strike jamb on single doors, and (2) per head for pair of doors. Stick-on silencers are not permitted.

e. Frame Hardware Reinforcements:
   1. Mortise hinge reinforcement: minimum 7 gage.
      a. Provide high frequency hinge reinforcement for top hinge on all exterior, cross corridor, and stairwell frames, in accordance with SDI 111-H, Example "A" Application, where full mortise hinges are specified.
   2. Strike reinforcements: minimum 16 gage and prepared for an ANSI-A115.1-2 strike.
   3. Closer reinforcement: minimum 14 gage steel.
   4. Projection weld hinge and strike reinforcements to the door frame.
   5. Provide metal plaster guards for all mortised cutouts.
   6. Provide adequate reinforcements for other hardware as required.
   7. Include galvanized hardware reinforcements in all galvannealed frames.

J. <u>FABRICATION</u>:

1. Face Welded Frames:
   a. Continuous face weld the joint between the head and jamb faces along their length either internally or externally. Grind, prime paint, and finish smooth face joints with no visible face seams.
   b. Externally weld, grind, prime paint, and finish smooth face joints at meeting mullions or between mullions and other frame members per a current copy of ANSI/SDI A250.8.
   c. Provide two temporary steel spreaders (welded to the jambs at each rabbet of door openings) on welded frames during shipment. Remove temporary steel spreaders prior to installation of the frame.

K. <u>FINISH</u>:

1. Doors, frames and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI/SDI A250.10 "Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."
2. Back prime all hollow metal door frames that are to be installed in masonry walls with suitable product as

recommended by manufacturer.

L. INSTALLATION:
1. Install doors and frames in accordance with Steel Door Institute's recommended erection instructions for steel frames ANSI A250.11.
2. Install label doors and frames in accordance with NFPA-80.
3. Remove temporary steel spreaders prior to installation of frames.
4. Set frames accurately in position; plumb, align and brace until permanent anchors are set. After wall construction is complete, remove temporary wood spreaders.
   a. Field splice only at approved locations indicated on the shop drawings. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
5. Provide full height 3/8" to 1-1/2" thick strip of polystyrene foam blocking at non-labeled frames requiring grouting where continuous hinges are specified. Apply the strip to the back of the frame, where the hinge is to be installed, to facilitate field drilling or tapping.
6. Where grouting is required in masonry, provide and install temporary bottom and intermediate wood spreaders to maintain proper width and avoid bowing or deforming of frame members. Refer to ANSI A250.11-2001, Standard.
   a. Hollow Metal Frames to receive grouting: comply with a current copy of ANSI/SDI Standard A250.8, paragraph 4.2.2, whereby grout will be mixed to provide a 4" maximum slump consistency and hand troweled into place. Do not use grout mixed to a thinner, pumpable consistency. Refer to HMMA 820 TN01 Grouting Hollow Metal Frames.
7. Provide a vertical wood brace during grouting of frame at openings over 4'0" wide, to prevent sagging of frame header.
8. Glaze and seal exterior transom, sidelight and window frames in accordance with HMMA-820 TN03.
9. Apply hardware in accordance with hardware manufacturers' instructions and Section 08 70 00 FINISH HARDWARE of these Specifications. Install hardware with only factory-provided fasteners. Adjust door installation to provide uniform clearance at head and jambs, to achieve maximum operational effectiveness and appearance.

M. ADJUSTING
1. Final Adjustments: Adjust operating doors and hardware items just prior to final inspection and acceptance by the Owner and Architect. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are damaged, bowed or otherwise unacceptable.
2. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

N. PROTECTION
1. Provide protective measures required throughout the construction period to ensure that door and frame units will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08 12 13

SECTION 08 14 29 – PRE-FINISHED WOOD DOORS

A. SUMMARY

1. Section Includes:
   a. Prefinished standard and fire rated type wood doors with flush faces.
   b. Prefit and premachine pre-finished wood doors.
2. Related Sections:
   a. Section 06 10 00 - Rough Carpentry.
   b. Section 08 12 13 – Steel Doors and Frames.
   c. Section 08 70 00 – Door Hardware.
   d. Section 08 81 00 – Glass and Glazing

B. REFERENCES

1. WDMA – Window and Door Manufacturers Association: IS 1-A 1997 Industry Standard for Architectural Flush Wood Doors.
2. NFPA-80 Standards for Fire Doors.
3. Uniform Building Code: UBC 7-2 1997, Fire Test of Door Assemblies.

C. SUBMITTALS

1. Shop Drawings and Product Data:
   a. Submit in accordance with Section 01 30 00.
   b. Indicate general construction, jointing methods, hardware and louver locations, and locations of cut-outs for glass. Indicate thickness of veneers.
2. Samples: Submit samples of wood veneer and factory finishing in accordance with WDMA Quality Standards I.S. 1-A 1997, sections G-18 and Guide Specifications 1.03 C.
3. Certification: Submit certification that doors and frames comply with UBC 7-2 1997.

D. QUALITY ASSURANCE

1. Fire-Rated Wood Doors: Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies in accordance NFPA 252 and which are labeled and listed for ratings indicated by ITS – Warnock Hersey, UL or other testing and inspection agency acceptable to authorities having jurisdiction.
   a. Doors: Comply with UBC 7-2 1997 where required.
   b. Provide intumescent requirements in compliance with UL-10C.
2. WDMA I.S. 1-A 1997 Quality Standard: Window and Door Manufacturers Association Quality Standards for grade of door, core, construction, finish, and other requirements.
3. Temperature Rise Rating: At stairwell enclosures, provide doors which have Temperature Rise Rating of 250 degrees F maximum in 30 minutes of fire exposure.

E. PRODUCT HANDLING

1. Plastic wrap and protect wood doors during transit, storage and handling to prevent damage, soiling or deterioration. Follow the Care and Installation guidelines as described in WDMA I.S. 1-A 1997.

F. GUARANTY/WARRANTY

1. Guarantee: Provide manufacturer's guarantee for all wood doors. Guarantee period: Lifetime of original installation. Doors exhibiting defects in materials or workmanship including warp and delamination within guarantee period shall be replaced (including hanging and finishing) with new doors. These terms shall be part of the manufacturer's standard warranty.

G. ACCEPTABLE MANUFACTURERS

1. Graham Manufacturing Corporation
2. Marshfield Door Systems
3. Weyerhaeuser Door Division
4. Vermont Industries

H. MATERIALS

1. Door Construction:
   a. Non-Fire Rated Doors: Thickness: 1-3/4 inches, interior flush wood, bonded, solid core conforming to WDMA I.S. 1-A 1997 and the following;
      1. Core: bonded particle core (PC) conforming to WDMA I.S. 1-A 1997.
      2. Door construction shall conform to WDMA I.S. 1-A 1997 Premium Grade requirements.
      3. Stiles: Hardwood to match face veneer over structural composite lumber (SCL), glued to core.
      4. Rails: Mill option hardwood or SCL. Top and bottom: 2 inches.
      5. Facing: Wood veneer as specified.
   b. Fire Rated Doors: Thickness: 1-3/4 inches, interior flush wood, bonded, solid core conforming to WDMA I.S. 1-A 1997 and the following;
      1. Core: bonded mineral core (FD) conforming to WDMA I.S. 1-A 1997.
      2. Door construction shall conform to WDMA I.S. 1-A 1997 Premium Grade requirements.
      3. Stiles: Hardwood to match face veneer over mineral composite, glued to core.
      4. Rails: Mineral composite as required by fire door authorities. Top and bottom: as required by manufacturer's fire door authorities.
      5. Facing: Wood veneer as specified.
2. Wood Veneer:
   a. Door face veneers shall meet HPVA "A" grade quality standards conforming to WDMA I.S. 1-A for transparent or semi-transparent finish. Minimum face veneer thickness shall be 1/50" at 12% moisture content after finish sanding.
   b. Species: Red Oak.
   c. Face Cut: Plain Sliced.
   d. Face Assembly: Book Match.
   e. Face Symmetry: Running Match.
3. Adhesives: Face to core adhesives shall be Type I or Type II as appropriate for location in building. Adhesives must be classified Type I or Type II per WDMA TM-6 "Adhesive Bond Test Method." Type I adhesives shall be used for doors in exterior applications, Type II adhesives shall be used for doors in interior applications.
4. Core:
   a. Non-rated and 20 minute doors: Solid particleboard.
   b. Fire-rated doors: Non-combustible mineral core containing no asbestos.

I. FACTORY FINISHING

1. Comply with referenced WDMA Section G-15, "Factory Finishing.".
2. Pre-finish wood doors at factory.
3. Transparent Finish: Match finish indicated in WDMA Section G-17: WDMA System #6.

J. ACCESSORIES

1. Vision Frames:
   a. Non-rated doors: Flush wood frames, hardwood to match facing.
   b. 20 minute fire rated doors: Provide manufacturer's tested metal clip or comparable system with wood stop appearance.
   c. Fire-rated doors: ITS – Warnock Hersey or UL approved glazing system.
   d. Glass: Refer to Section 08 81 00 for glass types.

K. FABRICATION

1. Fabricate wood doors in accordance with requirements of WDMA I.S. 1-A 1997 Quality Standards.
2. Fabricate fire rated doors in accordance with requirements of ITS – Warnock Hersey or Underwriters' Laboratories, with metal label on each door including UL-10C.
3. Fabricate doors with WDMA Quality Standards hardware blocking options as follows:
   a. Provide HB-1 – head and HB-2 – sill rails and HB-4 – lockblock on all doors.
   b. Provide HB-6 only when exit devices are specified for door.

   c. Provide HB-8 for pivots or when floor bolts are specified under Section 08 70 00 – Door Hardware.
4. Provide doors with minimum ¼ inch thick edge strips, of wood species to match face veneers except as required for fire rating.
5. Make cut-outs and provide stops for glass and louvers. Install metal door louvers. Seal cut-outs prior to installation of moldings.
   a. For full light doors: Provide cut out from flush wood door, with vertical grain direction.
6. Bevel lock and hinge edges of single acting doors 3 degrees or 1/8 inch in 2 inches. Radius strike edge of double acting swing doors as required by pivot hinge manufacturer.
7. Prepare doors to receive hardware. Refer to Section 08 70 00 – Door Hardware and NFPA 80 for hardware requirements including UL-10C.
   a. Prefit and bevel to net opening size less approximately 1/4 inch in width on single swing doors 3/16 inch in width for paired doors. Provide 1/4 inch clearance above finished floor, unless otherwise indicated on drawings. Provide 1/8 inch clearance at top of door.
   b. Slightly ease vertical edges.
8. Fire Rated Pair of Doors; greater than 20 minute: Supply overlapping astragals or metal edge sets only as required by NFPA 80 1999 or by door manufacturer's fire door authorities. If an astragal is required, to comply with fire rated labeling requirements for pairs of fire rated doors, provide door manufacturer's standard tested astragal.

L. EXAMINATION
1. Examine installed door frames before hanging doors.
2. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

M. INSTALLATION
1. Handle doors in accordance with recommendations of WDMA I.S. 1-A, "Care and Installation at Job Site."
2. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation. Store doors per recommendations of WDMA I.S. 1-A, "Care and Installation at Job Site."
3. Install in neat and workmanlike manner, free from hammer or tool marks, open joints or slivers.
4. Set plumb, level, square and true. Install work after building humidity is at acceptable level.
5. Remove and replace all doors found to be warped, twisted, bowed, or otherwise damaged. Do not install doors which cannot be properly fitted to frames.
6. Adjust prefinished doors and hardware and other moving or operating parts to function smoothly and correctly.
7. If doors are to be field finished, the process must follow the WDMA I.S. 1-A, "Care and Handling at Job Site" instructions for field applied finishes.
8. Ensure that smoke gaskets are in-place before prefinished door installation.

N. CLEANING AND PROTECTION
1. Clean prefinished doors and hardware.
2. At clear finished doors, do not partially cover door surfaces with paper, cardboard, or any other opaque covering that will create uneven aging of wood veneer.
3. Protect doors as necessary from damage until full occupancy by Owner.
4. Refinish or replace finished doors damaged during installation.

END OF SECTION 08 14 29

SECTION 08 36 13 - SECTIONAL OVERHEAD DOORS

A. SUMMARY OF WORK
1. Motor operated sectional overhead doors, with accessories and components.

B. RELATED WORK
1. Opening preparation, miscellaneous or structural steel work, field painting are in the scope of work of other trades and divisions of these specifications.

C. REFERENCE STANDARDS
1. ANSI/DASMA 102 - American National Standards Institute [A216.1] Specifications for sectional overhead doors published by Door & Access Systems Manufacturer Association, International in bulletin 102-1990.
2. ASTM A123 - Zinc [hot-dipped galvanized] coatings on iron and steel products.
3. ASTM A216 - Specifications for sectional overhead type doors.
4. ASTM A229 - Steel wire, oil-tempered for mechanical springs.
5. ASTM A-653-94 - Steel sheet, zinc-coated [galvanized] by the hot-dipped process, commercial quality.
6. ASTM D1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.
7. ASTM E84-91A - Tunnel test for flame spread and smoke developed index.
8. ASTM E330 - Structural performance of exterior windows,curtain walls,and doors by uniform static air pressure difference.
9. ASTM E413-87 - Sound transmission class. Acoustical performance value = 22 per.
10. ASTM E1332-90 - Outdoor-indoor transmission class. Acoustical performance value = 19.
11. ASTM E283-91 - Air infiltration = .07 CFM/FT2, 15 MPH.

D. SUBMITTALS
1. Submit under provisions of Division 1 and General Conditions.
2. Product Data: Manufacturer's product data, technical literature and installation instructions.
3. Shop Drawings: Clearly indicate the following:
   a. Design and installation details to withstand standard windload.
   b. All details required for complete operation and installation.
   c. Hardware locations.
   d. Type of metal and finish for door sections.
   e. Finish for miscellaneous components and accessories.
4. Operation and Maintenance Data.

E. QUALITY ASSURANCE
1. Sectional overhead doors and all accessories AND components required for complete and secure installations shall be manufactured as a system from one manufacturer.
2. Sectional overhead doors shall be tested and labeled certifying compliance with ASTM D1929 and ASTM E84-91A standards.
3. Installer Qualifications: Authorized by manufacturer.

F. DELIVERY, STORAGE AND HANDLING
1. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
2. Store and protect products in accordance with manufacturer's recommendations.

G. WARRANTY
1. Provide manufacturer's standard seven year warranty against separation/degradation of the polyurethane foam from the steel skin of the panel under provisions of Division 1. Standard manufacturer's ten year warranty against cracking, splitting or deterioration of steel skin due to rust-through.

H. MANUFACTURERS
1. Acceptable Manufacturers:
   a. Cloplay
   b. Haas Doors
   c. Overhead Door
   d. Raynor
   e. Wayne-Dalton Corporation.

I. SECTIONAL OVERHEAD DOORS
1. Standard specified shall be Wayne-Dalton Model TS 200, or approved equal.
   a. Operation: motor
   b. Material: Galvanized steel with baked-on polyester primer, ready for field finish paint.
   c. Insulation: Polyurethane
2. Insulated Sectional Overhead Doors: Insulated steel tongue-and-groove jointed panels with roll-formed internal struts with polypropylene rib caps to provide thermal break; end caps to provide tight seal at jambs; and hardware plates at all fastener points.
   a. Complying with ANSI/DASMA 102 requirements for commercial doors.
   b. Wind Load Performance: Withstanding 15.2 psf (728 Pa) external pressure and 12 psf (575 Pa) internal pressure when tested in accordance with ASTM E 330.
   c. Insulation: Foamed-in-place high density polyurethane core with flamespread of 10 and smoke density of 210 when measured in accordance with ASTM E 84.
   d. Finish: Two-coat baked-on polyester. Color: White.
   e. Panel Thickness: 2 inches.
   f. Face Sheet Thickness: 20 gauge.
   g. Panel Design: Flush.
   h. Thermal Resistance: Calculated "R" value of 17.50.
   i. Zinc Coating: Z275 galvannealed, before finishing.

J. COMPONENTS
1. Tracks: Design shall be standard lift. Vertical mounting angles shall be hot-dipped galvanized. Track size shall be 3". Vertical track shall be graduated to provide wedge type weathertight closing with continuous angle mounting for masonry jambs, and shall be fully adjustable to seal door at jambs. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.
   a. Material: 16 gage, 0.06 inch (1.52 mm), galvanized steel sheet, ASTM A 653/A 653M, Z120 hot-dipped zinc-aluminum coating.
2. Hardware:
   a. Hinges: Hot-dipped galvanized steel.
   b. Track Rollers: Steel, with case-hardened inner steel races and 10 ball bearings.
   c. Weatherstripping: Doors shall be equipped with factory-installed, top seal to seal against header, co-polymer joint seals between sections and vinyl "bulb" shaped astragal provided on the bottom section.
   d. Locks shall engage the right-hand vertical track and utilize standard size rim cylinder.
3. Counterbalances: Spring torsion type capable of supporting entire door weight, made of ASTM A 229/A 229M oil-tempered steel wire.
   a. Performance: Minimum of 25,000 cycles.
   b. Spring Fittings and Drums: Die-cast high strength aluminum.
   c. Cables: Preformed galvanized steel aircraft cables with minimum safety factor of 5 to 1.

K. OPERATORS
1. Products:
   a. LiftMaster Industrial Duty Trolley Operator – Model T.
   b. Raynor Industrial Duty Trolley Operator – Model RBT.

c. Approved Equal.
2. Three (3) button stations, up/down/stop operations. See Electrical Drawings for locations.
3. The Overhead Door/Operator Contractor shall be responsible to install and connect the push button stations to the operators.
4. Electrical requirements: See Electrical Drawings
5. Provide spring loaded disconnect for manual operations.

L. PHOTO ELECTRIC SENSOR
1. Furnish and install microwave sensors at all overhead doors.
2. Sensors shall be Model GD11S, universal beam, by Microwave Sensors, or approved equal.
3. Universal beam units shall be surface mounted.
4. Units shall have a factory set time delay of 0.5 seconds.
5. Specifications:
   a. Range: 0-30 feet.
   b. Power Requirements: 12 to 24 VAC or DC, 100mA.
   c. Relay: N.O. or N.C. contacts.
   d. Relay Contact Rating: 1A, 24 VAC or DC.
   e. Relay Surge Protection: Over 300 volts.
   f. Temperature Range: 0 to 140 degrees F.
   g. Finish: Brushed anodized aluminum.
   h. Time Delay: Adjustment of ½ to 15 seconds.
   i. Bracket: Extends from 43 to 8 inches.
   j. Size: 1-1/2” wide x 1-1/2” deep x 5-3/4” long.
6. Photo Electric Sensor Units and all associated power and control wiring shall be furnished and installed by Overhead Door/Operator Contractor.
7. All low voltage wiring shall be totally enclosed within the sensor box. The electrical power shall have conduit attached to the sensor box.

M. EXAMINATION
1. Before beginning work, verify that openings have been properly prepared, and that existing conditions are ready to receive sectional overhead door work.

N. INSTALLATION
1. Install in accordance with manufacturer's instructions and standards.
2. Install door complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's instructions, and as specified herein.
3. Install doors plumb, level, and operating smoothly without binding.
4. Upon completion of final installation lubricate, test and adjust doors to operate easily, free from warp, twist or distortion and fitting for entire perimeter.

END OF SECTION 08 36 13

SECTION 08 41 13 - ALUMINUM STOREFRONT

A. WORK INCLUDED

1. Furnish and install aluminum storefront systems as shown on drawings and specified in this section.

B. RELATED WORK

1. Masonry – Section 04 20 00
2. Joint Sealers – Section 07 92 00
3. Glass and Glazing – Section 08 80 00

C. SUBMITTALS

1. Contractor shall submit shop drawings, finish samples, test reports, and warranties per Division 1 General Requirements.
   a. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, etc.
   b. Design for windload of 30 PSF with maximum deflection in both vertical and horizontal mullions not to exceed 1/175 of span.

D. STANDARDS

1. American Society for Testing and Materials (ASTM)
2. Underwriter's Laboratories (UL)
3. American National Standards Institute (ANSI)
4. Aluminum Association (AA)

E. WARRANTY

1. Materials and workmanship furnished and installed shall be free from defects for a period of one (1) year from date of final acceptance. It is the responsibility of this contractor to provide a watertight installation.

F. PRODUCTS

1. Aluminum Storefront System: Standard specified shall be Tubelite 14000T thermally broken system, or equal.
   a. Frames
      1. Extrusions shall be 6063-T5 alloy and tempered.
      2. Provide polypropylene backed wool pile weather stripping.
      3. Frames shall be constructed of extruded aluminum sections.
      4. Corners shall be square cut and fastened using stainless steel screens and extruded corner brackets.
      5. Acceptable Manufacturers:
         a. Kawneer Co., Inc.
         b. Vistawall Architectural Products
         c. Tubelite
         d. YKK
   b. Break Metal: Where indicated on the Drawings, all break metal shall be .063 anodized aluminum. All break metal shall be broken to required shape at factory before final anodization.
   c. Fabrication: Accurately fit to surrounding work. Connections securing the aluminum framing to the building structure shall be so designed that the framing can be properly plumbed and aligned to compensate for variations in the building sub-structure.
   d. Finish: Class I, Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I) complying with AAMA 607.1.

G. DELIVERY, STORAGE, AND HANDLING

1. Do not allow doors and frames to be delivered to project site until work has sufficiently progressed and preparations made that will enable new window installation to proceed upon delivery.
2. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

H. WARRANTIES

1. Total System
   a. The contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total installation which includes that of the frames, windows, glass, glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.
   b. Any deficiencies due to such elements not meeting the specifications shall be corrected by the contractor at his expense during the warranty period.

I. EXECUTION

1. Inspection
   a. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings.
2. Installation
   a. Use only skilled tradesmen. Complete work in accordance with approved shop drawings and specifications.
   b. Plumb and align units in a single plane for each wall plane and erect materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.
   c. Furnish and apply sealants to provide a weathertight installation at all joints and inter-sections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
3. Adjusting and Cleaning
   a. After completion of installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc.

END OF SECTION 08 41 13

SECTION 08 70 00 - FINISH HARDWARE

A. WORK INCLUDED

1. This work shall include the furnishing and delivery to the Contractor of all the finish hardware, including all screws, bolts and other devices required to complete the work.
2. Templates of all hardware shall be promptly furnished to the metal door frame manufacturer.

B. DELIVERY OF HARDWARE

1. All finish hardware will be installed under the Carpentry Division. The Contractor will issue instructions for the time and place of delivery.

C. SUBMITTALS

1. Submit PDF file of hardware schedule to Architect with catalog-cuts of each item of hardware listed for approval.
2. Submit above, prior to ordering material, in accordance with General conditions.

D. INSTALLATION

1. Install all hardware per manufacturer's directions, a mounting heights recommended by the Door and Hardware Institute, and in compliance with the ADAAG.

E. FINISH HARDWARE SCHEDULE

1. All hardware shall be of the makes and models listed in the attached Hardware Schedule, or approved equals.
2. Furnish and deliver all finish hardware, complete with all necessary fasteners. Provide templates for all hardware to metal door manufacturer.

PRODUCT	SPECIFIED MANUFACTURER	APPROVED EQUAL
Hinges	Hager	Stanley, McKinney
Locksets, Cylinders	Sargent	
Closers	LCN	Sargent, Corbin/Russwin
Stops	Hager	Burns, Ives, Rockwood
Kickplates	Hager	Burns, Ives, Rockwood
Flush bolts	Hager	Burns, Ives, Rockwood
Thresholds	National Guard	Pemko, Zero
Weatherstrip	National Guard	Pemko, Zero
Electric Strikes	Hanchett Entry Systems	

1. The successful hardware supplier must have an architectural hardware consultant on staff.
2. The successful hardware supplier is responsible to field verify all existing doors to ensure compatibility of new hardware.

HARDWARE SET 1 - Door: 103, 105, 106, 107, 108A, 108B, 109, 110, A103, A104

30	Ea.	Hinges	BB1279 4.5 x 4.5 x US26D	HA
10	Ea.	Lever Lockset	8205 LNL x 26D	SA
10	Ea.	Wall Stop	232W x US32D	HA

HARDWARE SET 2 - Door: 111

3	Ea.	Hinges	BB1279 4.5 x 4.5 x US26D	HA
1	Ea.	Lever Lockset	8204 LNL x 26D	SA
1	Ea.	Wall Stop	232W x US32D	HA

HARDWARE SET 3 – Door: 126, A101D, A101E, A102B

12	Ea.	Hinges:	BB1279 4.5 x 4.5 x US26D NRP	HA
4	Ea.	Lever Lockset	8205 LNL x 26D	SA
4	Ea.	Closer	4041 x AL	LC
4	Ea.	Kick Plate	190S 8” x 34” x US32D	HA
4	Ea.	Threshold	424 x 36” x AL	NA
4	Ea.	Door Sweep	102 VA x 36”	NA
4	Ea.	Weatherstrip	700 NA 1 x 36” + 2 x 84”	NA

HARDWARE SET 4 – Door: A101A, A105

6	Ea.	Hinges:	BB1279 4.5 x 4.5 x US26D NRP	HA
2	Ea.	Lever Lockset	8205 LNL x 26D	SA
2	Ea.	Closer	4041 x AL	LC
2	Ea.	Kick Plate	190S 8” x 34” x US32D	HA
2	Ea.	Threshold	424 x 36” x AL	NA
2	Ea.	Door Sweep	102 VA x 36”	NA
2	Ea.	Weatherstrip	700 NA 1 x 36” + 2 x 84”	NA
2	Ea.	Electric Strike	5200	HES

HARDWARE SET 5 – Door: A102A, A102D

12	Ea.	Hinges:	BB1279 4.5 x 4.5 x US26D	HA
2	Ea.	Lever Lockset	8205 LNL x 26D	SA
2	Ea.	Lever Lockset	8294 LNL x 26D	SA
		(with template #4298, to accept latchbolt from active door)		
4	Ea.	Closer	4041 x AL	LC
2	Ea.	Flush Bolts	282D x US26D	HA
2	Ea.	Dustproof Strike	280X x US26D	HA
4	Ea.	Kick Plate	190S 8” x 34” x US32D	HA

END OF SECTION 08700

SECTION 08 80 00 - GLASS AND GLAZING

A. SCOPE OF WORK

1. Furnish and install float glass, of the types and at the locations indicated on the drawings, including but not limited to the following:
   a. Insulated Glass for Storefront Framed Windows - See Section 08 41 13.
   b. Interior glass for Interior Borrow Lights and Vision Panels.

B. STANDARDS

1. American National Standard Institute (ANSI).
2. American Society for Testing Materials (ASTM).
3. Flat Glass Marketing Association (FGMT).
4. Ohio Building Code (OBC).
5. Underwriters Laboratories (UL).
6. Manufacturer's published glazing recommendations.

C. REFERENCES

1. ANSI Z 97.1 - Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.
2. ASTM C 1036 - Standard Specification for Flat Glass.
3. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.
4. ASTM C 1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
5. ASTM E 773 - Standard Test Method for Accelerated Weathering of Sealed Insulating Glass Units.
6. ASTM E 774 - Standard Specification for the Classification of the Durability of Sealed Insulating Glass Units.
7. ASTM E 2188 – Standard Test Method for Insulating Glass Unit Performance.
8. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
9. CPSC 16CFR-1201 - Safety Standard for Architectural Glazing Materials.
10. Glass Association of North America (GANA) Glazing Manual.

D. DEFINITIONS

1. Sealed Insulating Glass Unit Surfaces:
   a. Surface No. 1: Exterior surface of outer lite.
   b. Surface No. 2: Interior surface of outer lite.
   c. Surface No. 3: Exterior surface of inner lite.
   d. Surface No. 4: Interior surface of inner lite.
   e. Airspace: Space between lites of an insulating glass unit that contains dehydrated air or other inert specified gas.

E. SUBMITTALS

1. Product Data: Manufacturer's specifications, including performance characteristics, and installation instructions for each type of glass and glazing material specified, and spacers and compressible filler rod.
2. Shop Drawings: Submit manufacturer's or fabricator's shop drawings, including plans, elevations, sections, and details, indicating glass dimensions, tolerances, types, thicknesses, and coatings.
3. Samples:
   a. Glass: 12 x 12 inch pieces for each type of glass specified.
   b. Color Samples for Glazing Materials: Manufacturer's standard colors.
4. Fabricator's Certification: Submit fabricator's certification by manufacturer.
5. Quality Control Submittals:

a. Test Reports: Certified test data to sufficiently substantiate glass or glass assembly compliance with requirements specified.

6. Warranty: Submit manufacturer's standard warranty for sealed insulating glass units.

F. QUALITY ASSURANCE

1. Manufacturer's Qualifications: Minimum of 5 years experience manufacturing specified glass type(s).
2. Fabricator's Qualifications: Minimum of 5 years experience manufacturing insulating glass units meeting ASTM E 2190, Class CBA.
   a. Certified by manufacturer.

G. DELIVERY, STORAGE, AND HANDLING

1. Delivery:
   a. Deliver glass to site in accordance with manufacturer's instructions.
   b. Deliver glass in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer.
2. Storage:
   a. Store glass in accordance with manufacturer's instructions.
   b. Store glass in clean, dry area indoors.
   c. Protect from exposure to direct sunlight and freezing temperatures.
   d. Apply temporary coverings loosely to allow adequate ventilation.
   e. Protect from contact with corrosive chemicals.
   f. Avoid placement of glass edge on concrete, metal, and other hard objects.
   g. Rest glass on clean, cushioned pads at 1/4-points.
3. Handling:
   a. Handle glass in accordance with manufacturer's instructions.
   b. Protect glass from damage during handling and installation.
   c. Do not slide 1 lite of glass against another.
   d. Do not use sharp objects near unprotected glass.

H. PRODUCTS AND MANUFACTURERS

1. Double-Glazed Sputter-Coated Insulating Glass Units: Standard Specified: Guardian Industries SN 68
   a. Conformance: ASTM E 2190, Class CBA.
   b. Outboard Lite: Clear float glass.
      1. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
      2. Glass Thickness: 6 mm (1/4 inch).
      3. Heat-Treatment:
         a. Heat-strengthened, ASTM C 1048, Kind HS.
         b. Tempered; ASTM C 1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1.
   c. Air Space: 12 mm (1/2 inch) wide, hermetically sealed, dehydrated air space.
   d. Inboard Lite: Sputter-coated Low-E clear float glass.
      1. Annealed Clear Float Glass: ASTM C 1036, Type 1, Class 1, Quality q3.
      2. Vacuum Deposition Sputtered Coating: ASTM C 1376.
      3. Coating on Surface No. 3.
      4. Glass Thickness: 6 mm (1/4 inch).
      5. Heat Treatment:
         a. Heat-strengthened, ASTM C 1048, Kind HS.
         b. Tempered; ASTM C 1048, Kind FT; CPSC 16CFR-1201; ANSI Z 97.1.
   e. Glass Unit Performance Characteristics:
      1. Visible Light Transmittance: 68 percent
      2. Visible Light Reflectance Outdoors: 11 percent

3. Direct Solar Energy Transmittance: 33 percent
4. Direct Solar Energy Reflectance Outdoors: 32 percent
5. Winter U-Value Nighttime: 0.29
6. Summer U-Value Daytime: 0.28
7. Shading Coefficient: 0.43
8. Solar Heat Gain Coefficient: 0.38
9. Summer Relative Heat Gain: 90

f. Edge Seals: ASTM E 773, with aluminum spacers and silicone sealant for glass-to-spacer seals.
g. Sealant: Approved by glass manufacturer.

3. Interior glass at vision panels: 1/4" clear tempered plate safety glass.
4. Acceptable Manufacturers:
   a. AFG
   b. Ford Glass
   c. Guardian Industries Corp.
   d. Libby-Owens-Ford Co.
   e. PPG
5. Glazing Materials:
   a. Silicone sealant: FS FF-S001543, Class A; non-acid type, except acid type if channel surfaces are porous.

I. EXAMINATION

1. The glazing contractor shall examine the framing or glazing channel surfaces, backing, removable stop design, and the conditions under which the glazing is to be performed, and notify the Architect in writing, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the glazing until all unsatisfactory conditions have been corrected in a manner acceptable to the glazing contractor.

J. PREPARATION

1. Verify glazing openings are correct size and within tolerance.
2. Verify glazing channels, recesses, and weeps are clean and free of obstructions.

K. INSTALLATION OF GLASS

1. General: Except as otherwise indicated, comply with glass manufacturer's instructions, glazing materials manufacturer's instructions, and "Glazing Manual" by FGMA and other technical publications of recognized authorities in the industry. Install each piece to achieve watertight and airtight performance, and to minimize breakage.
   a. Clean channel surfaces and prime as recommended by sealant manufacturer.
   b. Cut glass to size required for measured opening; provide adequate edge clearance and glass bit all around. Cut prior to tempering or strengthening, if any, and prior to fabrication into insulating glass units, if any.
   c. Do not install sheets which have significant edge damage or other defects.
   d. Install setting blocks at quarter points. Set in a bed of sealant if heel-bead is used.
   e. Install spacers inside and out, all around, wherever liquid or plastic/mastic compounds are used.
   f. Do not leave voids in the glazing channel.
   g. Replace glass which is broken or damaged prior to the time of acceptance.
   h. Required Performance: Each piece of exterior glass must be airtight and watertight, and without glass breakage through normal weather/temperature cycles and through normal door/window operations.

L. FIELD QUALITY CONTROL

1. Coated glass, when viewed from minimum of 10 feet, exhibiting slightly different hue or color not apparent in hand samples, will not be cause of rejection of glass units, as determined by Architect.
2. Verify glass is free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

L. CLEANING
1. Clean glazing in accordance with manufacturer's instructions. Use only procedures and cleaning agents approved by glazing manufacturer.
2. Remove excess glazing compounds.
3. Remove labels and protective masking paper.
4. Wash both faces of glazing.
5. Remove debris from the premises.

M. PROTECTION
1. Protect installed glass from damage during construction.
2. Protect installed glass from contact with contaminating substances resulting from construction operations.
3. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

END OF SECTION 08 80 00

SECTION 09 21 16 – GYPSUM BOARD ASSEMBLIES

A. DESCRIPTION OF WORK

1. The extent of the gypsum drywall is shown on the Drawings and in schedules and is hereby defined to include gypsum board work with a tape-and-compound joint treatment system known as "drywall finishing" work.
2. The types of work required include the following:
   a. Gypsum drywall including screw-type metal support system.
   b. Drywall finishing (joint tape-and-compound treatment).
   c. See drawings for limits of drywall installation and limits of other installations of finishes.

B. QUALITY ASSURANCE

1. Where work is indicated for fire-resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed to be recognized authorities.
2. Comply with applicable requirements of GA-216 "Application and Finishing of Gypsum Board" by the Gypsum Association, except where more detailed or more stringent requirements are indicated, including the recommendations of the manufacturer.
3. 1/8" offsets between planes of board faces and 1/4" in 8'-0" for plumb, level, warp, and bow.
4. Obtain gypsum boards, trim accessories, adhesives, and joint treatment products from a single manufacturer or from manufacturers recommended by the prime manufacturer of gypsum boards.

C. SUBMITTALS

1. For information only, submit two copies of manufacturer's product Specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these Specifications. Distribute an additional copy of each installation instruction to the installer.

D. PRODUCT HANDLING

1. Deliver gypsum drywall materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type, and grade. Store in a dry, well ventilated space, protected from the weather, under cover and off the ground.

E. JOB CONDITIONS

1. Installer must examine the substrates and the spaces to receive gypsum drywall and the conditions under which gypsum drywall is to be installed and shall notify the Contractor, in writing, of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
2. Maintain ambient temperatures at not less than 55 degrees F for the period of 24 hours before drywall finishing, during installation, and until compounds are dry.

F. PRODUCTS

1. Metal Support Materials:
   a. To the extent not otherwise indicated, comply with Gypsum Association Specification GA – 203 "Installation of Screw-Type Steel Framing." Members to receive gypsum board (as specified and recommended), for metal system supporting gypsum drywall work.
   b. Drywall Suspension System: Armstrong Contract Interiors – Drywall System.
      1. Hangers shall be 3/8" threaded steel rods. Include all fasteners and accessories.
   c. Studs: 1-1/2 x 3-5/8 steel as furnished under Carpentry, except as otherwise indicated.

d. Runners: Match studs, type recommended by stud manufacturer for floor and ceiling support of studs and for vertical abutment of drywall work at other work.
e. Stud System Accessories: Provide stud manufacturer's standard clips, shoes, ties, reinforcements, fasteners, and other accessories as needed for a complete stud system. Horizontal reinforcement shall be provided as per manufacturer's published recommendations for height of various assemblies.
f. Fasteners: Type and size recommended by furring manufacturer for the substrate and application indicated.
g. Screw-type metal stud framing is to be designed to support all dead and live loads.

2. Gypsum Board Products: To the extent not otherwise indicated, comply with GA-216 as specified and recommended:
   a. Fiber Reinforced Gypsum Board – Provide at all locations except where noted otherwise.
      1. Manufacturer: Standard Specified: Abuse Resistant VHI Firecode X, as manufactured by USG.
         a. Acceptable Manufacturers:
            1. BPB America, Inc.
            2. Georgia Pacific Gypsum
            3. National Gypsum Co.
            4. U.S. Gypsum
      2. Provide products that meet or exceed the requirements of ASTM C1278 and physical properties of ASTM C36.
      3. Panel Thickness: 5/8" with tapered edges.
   b. Gypsum Wall Board: Type "X" (fire- resistive) gypsum drywall with tapered long edges.
      1. Sheet Size: Maximum length available which will minimize end joints.
      2. Thickness: 5/8" except where otherwise indicated.
      3. Manufacturers:
         a. BPB America, Inc.
         b. Georgia Pacific Gypsum
         c. National Gypsum Co.
         d. U.S. Gypsum
3. Trim Accessories:
   a. Manufacturer's standard galvanized steel beaded units with flanges for concealment in joint compound, including corner beads, edge trim, and control joints; except provide semi-finishing type (flange not concealed) where indicated.
4. Joint Treatment Materials:
   a. ASTM C475, type recommended by the manufacturer for the application indicated, except as otherwise indicated.
   b. Joint Tape: Perforated type.
   c. Joint Compound: Ready-mixed vinyl type for interior use.
5. Miscellaneous Material:
   a. Provide auxiliary materials for gypsum drywall work of the type and grade recommended by the manufacturer of the gypsum board.
   b. Gypsum Board Fasteners: Comply with GA-216.
   c. Concealed Acoustical Sealant: Mastic type, non-shrinking, non-drying, non-migrating, and non-staining.
   d. Exposed Acoustical Sealant: Latex, acrylic, or acrylic-latex type, permanently elastic and paintable.
   e. Sound Insulation: See Division 7 – Insulation.

G. EXECUTION

1. Installation of metal support systems:
   a. To the extent not otherwise indicated, comply with GA-216 and manufacturer's instructions.

b. Install supplementary framing, runners, furring, blocking, and bracing at opening and terminations in the work and at locations required to support fixtures, equipment, services, heavy trim, furnishings, and similar work which cannot be adequately supported directly on gypsum board alone.

2. General Gypsum Board Installation Requirements:
   a. Meet at the project site with the installers of related work and review the coordination and sequencing of work to ensure that everything to be concealed by gypsum drywall has been accomplished and that chases, access panels, openings, supplementary framing and blocking, and similar provisions have been completed.
   b. Install sound insulation if indicated, prior to gypsum board.
   c. Install wall/partition boards vertically to avoid end-butt joints wherever possible. At high walls, install boards horizontally with end joints staggered over studs.
   d. Space fasteners in gypsum boards in accordance with GA-216 and manufacturer's recommendations, except as otherwise indicated.
3. Installation of Drywall Trim Accessories:
   a. Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges by nailing or stapling in accordance with manufacturer's instructions and recommendations.
   b. Install metal corner beads to external corners of drywall work.
   c. Install metal edge trim whenever edge of gypsum board would otherwise be exposed or semi-exposed.
4. Installation of Drywall Finishing: Comply with ASTM C 840 and GA-216 for Level 5 finish for all gypsum board exposed to view.
   a. Apply treatment at gypsum board joints (both directions, flanges, of trim accessories, penetration, fastener heads, surface defects, and elsewhere as required to prepare work for decoration). Prefill open joints and rounded or beveled edges, using type of compound recommended by manufacturer.
   b. Apply joint tape at between gypsum boards, except where a trim accessory is indicated.
   c. Apply joint compound in three coats (not including prefill of openings in base) and sand between last two coats and after last coat.
   d. Refer to other section for decorative finishes to be applied to drywall work.

H. PROTECTION OF WORK

1. Installer shall advise contractor of required procedures for protection of the gypsum drywall work from damage and deterioration during the remainder of the construction period.

END OF SECTION 09 21 16

SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

A. RELATED DOCUMENTS

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. SUMMARY

1. This Section includes the following:
   a. Wall Studs.
   b. Bracing, fasteners, and related accessories for light-gauge, load-bearing metal elements.

2. Related Sections include the following:
   a. Division 5 Section "Structural Steel" for masonry shelf angles and connections.
   b. Division 5 Section “Steel Deck” for metal decking.
   c. Division 6 Section "Carpentry" for wall sheathing or roof sheathing using wood-based products.
   d. Division 7 for insulation, roof deck assemblies, shingles, and metal roofing.

C. DEFINITIONS

1. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of cold-formed framing delivered to the Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.
2. Producer: Entity that produces steel sheet coil fabricated into cold-formed members.

D. PERFORMANCE REQUIREMENTS

1. Structural Performance: Where cold-formed metal framing sizes are not indicated on drawings, provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   a. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
      1. Upward and downward movement of 1/2 inch.

E. SUBMITTALS

1. Product Data: For each type of cold-formed metal framing product and accessory indicated.
2. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining Work.
   a. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Mill certificates signed by steel sheet producer [or test reports from a qualified independent testing agency] indicating steel sheet complies with requirements.
4. Welding Certificates: Copies of certificates for welding procedures and personnel.
5. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
6. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
   a. Power-actuated anchors.

b. Mechanical fasteners.
c. Vertical deflection clips.
d. Miscellaneous structural clips and accessories.

7. Research/Evaluation Reports: Evidence of cold-formed metal framing's compliance with The Ohio Building Code.

F. QUALITY ASSURANCE

1. Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
2. Engineering Responsibility: Engage a qualified professional engineer to prepare design calculations, Shop Drawings, connection details, and other structural data.
3. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
4. Mill certificates signed by steel sheet producer [or test reports from a qualified independent testing agency] indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, [ductility,] and galvanized-coating thickness.
5. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
6. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
7. AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
   a. CCFSS Technical Bulletin: "AISI Specification Provisions for Screw Connections."
8. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

G. DELIVERY, STORAGE, AND HANDLING

1. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
2. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

H. MANUFACTURERS

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
   a. Allied American Studco, Inc.
   b. Angeles Metal Systems.
   c. California Expanded Metal Products Co.
   d. California Metal Systems, Inc.
   e. Clark Steel Framing Industries.
   f. Consolidated Fabricators Corp.
   g. Consolidated Systems, Inc.
   h. Dale Industries, Inc.
   i. Design Shapes in Steel.
   j. Dietrich Industries, Inc.

k. Knorr Steel Framing Systems.
l. MarinoWare; Div. of Ware Industries, Inc.
m. Steel Construction Systems.
n. Unimast, Inc.
o. United Metal Products, Inc.

I. MATERIALS
1. Comply with ASTM C955-00.
2. Steel Sheet: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   a. Grade: 40 (yield point 40,000 psi) for units 16-gauge and heavier. Grade: 33 (yield point 33,000 psi) for units 18-gauge and lighter.
   b. Coating: Galvanized ASTM A525 [G60].

J. WALL STUDS
1. Steel Studs: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:
   a. Minimum Uncoated-Steel Thickness:As indicated on drawings.
   b. Flange Width: As indicated on drawings.
   c. Section Properties: As indicated on drawings.

K. FRAMING ACCESSORIES
1. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi (230 MPa).
2. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   a. Supplementary framing.
   b. Bracing, bridging, and solid blocking.
   c. Web stiffeners.
   d. End clips.
   e. Gusset plates.
   f. Stud kickers, knee braces, and girts.
   g. Joist hangers and end closures.
   h. Hole reinforcing plates.
   i. Backer plates.

L. ANCHORS, CLIPS, AND FASTENERS
1. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
2. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
3. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
4. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
   a. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
5. Welding Electrodes: Comply with AWS standards.

M. MISCELLANEOUS MATERIALS
1. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

2. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration or premixed, non-metallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

N. FABRICATION
1. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
   a. Fabricate framing assemblies using jigs or templates.
   b. Cut framing members by sawing or shearing; do not torch cut.
   c. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
      1. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      2. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   d. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
2. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
3. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   a. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   b. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

O. EXAMINATION
1. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

P. PREPARATION
1. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

Q. INSTALLATION, GENERAL
1. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
2. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.
3. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   a. Bolt or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
4. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

a. Cut framing members by sawing or shearing; do not torch cut.
b. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
   1. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   2. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   3. Reinforce connections and attachments with fasteners in direct tension (pull out) with minimum 0.0538 inch – 16-gauge cover plates.

5. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
6. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
7. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
8. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
9. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   a. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

R. FIELD QUALITY CONTROL

1. Remove and replace Work that does not comply with specified requirements.

S. REPAIRS AND PROTECTION

1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
2. Protect paper-surfaced gypsum sheathing that will be exposed to weather for more than 30 days by covering exposed exterior surface of sheathing with a securely fastened air-infiltration barrier. Apply covering immediately after sheathing is installed.
3. Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.
4. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 09 22 16

SECTION 09 51 13 – ACOUSTICAL CEILING SYSTEM

A. SUMMARY

1. Section Includes:
   a. Acoustical ceiling panels.
   b. Exposed grid suspension system.
   c. Wire hangers, fasteners, main runners, cross tees, wall angle moldings, and hold-down clips.
2. Related Sections:
   a. Section 09 21 16 - Gypsum Board Assemblies
   b. Divisions 22 and 24 - Mechanical Work
   c. Division 26 Sections - Electrical Work
3. Substitutions
   a. Requests shall be in accordance with Division 1.

B. REFERENCES

1. American Society for Testing and Materials (ASTM):
   a. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   b. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
   c. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
   d. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   e. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
   f. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
   g. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
   h. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
   i. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
   j. ASTM E 1264 Classification for Acoustical Ceiling Products.
   k. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
   l. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
   m. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.
2. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

C. SUBMITTALS

1. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.
2. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
3. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.
4. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

5. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

D. QUALITY ASSURANCE
1. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
2. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   a. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
      1. Flame Spread: 25 or less
      2. Smoke Developed: 50 or less
   b. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
      1. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

E. DELIVERY, STORAGE, AND HANDLING
1. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
2. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
3. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

F. PROJECT CONDITIONS
1. Space Enclosure:
   a. All ceiling products and suspension systems must be installed and maintained in accordance with manufacturer’s written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32oF (0o C) and 120oF (49o C) and not subject to abnormal conditions. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.
   b. Standard Ceilings: Do not install interior ceilings until space is enclosed and weatherproof; wet work in place is completed and nominally dry; work above ceilings is complete; and ambient conditions of temperature and humidity are continuously maintained at values near those intended for final occupancy. Building areas to receive ceilings shall be free of construction dust and debris.

G. WARRANTY
1. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
   a. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
   b. Grid System: Rusting and manufacturer's defects
   c. Acoustical Panels designated as inherently resistive to the growth of micro-organisms: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

2. Warranty Period:
   a. Acoustical panels: Ten (10) years from date of substantial completion.
   b. Grid: Ten years from date of substantial completion.
   c. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.
3. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

H. MAINTENANCE
1. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
   a. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
   b. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 5.0 percent of amount installed.

I. MANUFACTURERS / PRODUCTS
1. Acoustical Ceiling Tile Panels - 2 x 4
   a. Surface Texture: Medium
   b. Composition: Mineral Fiber
   c. Color: White
   d. Size: 24 in X 48 in
   e. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
   f. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
   g. Flame Spread: ASTM E 1264; Class A (UL)
   h. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.82.
   i. Dimensional Stability: Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
   j. Antimicrobial Protection: Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
   k. Acceptable Products:
      1. Armstrong Contract Interiors – Angled Tegular Lay-in “Fine Fissured Second Look II” #1761 with "Prelude XL" -15/16" Exposed Tee Grid.

J. EXAMINATION
1. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

K. PREPARATION
1. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.
2. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
   a. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

L. INSTALLATION

1. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.
2. Suspend main beam from overhead construction with hanger wires spaced 4’-0” on center along the length of the main runner. Install hanger wires plumb and straight.
3. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.
4. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

M. ADJUSTING AND CLEANING

1. Replace damaged and broken panels.
2. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RUBBER WALL BASE

A. SUMMARY
1. Section Includes: Resilient Rubber Wall Base.

B. RELATED DOCUMENTS
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

C. SUBMITTALS
1. Product Data: For each type of product indicated.
2. Samples for Initial Selection: For each type of product indicated.
3. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

D. DELIVERY, STORAGE, AND HANDLING
1. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Johnsonite, but not less than 55 deg F or more than 85 deg F.

E. PROJECT CONDITIONS
1. Install resilient products after other finishing operations, including painting, have been completed.
2. Maintain ambient temperatures within range recommended by Johnsonite, but not less than 65 deg F or more than 85 deg F in spaces to receive resilient products during the following time periods:
   a. 48 hours before installation.
   b. During installation.
   c. 48 hours after installation.
3. Maintain the ambient relative humidity between 40% and 60% during installation.
4. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F.

F. RESILIENT WALL BASE
1. Traditional Rubber Wall Base, 1/8” thick, as manufactured by Johnsonite.
   a. Style DC – (with toe).
   b. Height – See Drawings.
   c. Length – Coils for seamless installation.
   d. Color as selected by Architect.
2. Manufactured from a proprietary thermoplastic rubber formulation.
3. Meets performance requirements for ASTM F 1861 Standard Specification for Resilient Wall Base, Type TP, Group 1.
4. ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class I.
5. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class A, Smoke <450.
6. Flexibility: Does not crack, break, or show any signs of fatigue when bent around a 1 1/4" diameter cylinder when tested according to ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocols.
7. Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.

G. INSTALLATION MATERIALS

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based formulation manufactured and warranted by a reputable manufacturer.
2. Adhesives: as recommended by manufacturer to meet site and substrate conditions.

H. EXAMINATION
1. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the work.
2. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

I. PREPARATION
1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient wall base.
2. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
3. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
4. Vacuum clean substrates to be covered by resilient products immediately before installation.

I. INSTALLATION
1. Comply with manufacturer's written instructions for installing resilient base.
2. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
3. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
4. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
5. Do not stretch resilient base during installation.
6. Job-formed corners:
   a. Outside corners: Form by bending without producing discoloration (whitening) at bends.
   b. Inside corners: Butt one piece to corner then scribe next piece to fit.

J. CLEANING AND PROTECTION
1. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
2. Perform the following operations immediately after completing resilient product installation:
   a. Remove adhesive and other blemishes from exposed surfaces.
   b. Damp-mop surfaces to remove marks and soil.
3. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

M. MAINTENANCE
1. Do not perform manufacturer's recommended maintenance procedures until adhesive has fully cured, no sooner than 72 hours after installation.
2. Use only cleaning products recommended by the manufacturer.
3. Protect installed product from damage and construction operations and inspect immediately before final acceptance of project.

END OF SECTION 09 65 13

SECTION 09 68 13 – TILE CARPETING

A. WORK INCLUDED

1. The work under this section includes the furnishing of all labor, material, equipment, appliances and tools to perform the work indicated on the Drawing or specified herein. The work shall include, but not be limited to the following:
   a. Preparation
   b. Floor Sealer
   c. Carpeting
   d. Adhesives
   e. Edge Strips
2. Installation of material under this division shall produce a complete carpet installation on concrete subfloor.
3. Ordinary cleaning and nominal surface preparation.
4. Clean floors and apply leveling compound and substrate primer in accordance with manufacturer's instructions. It is this Contractor's responsibility to determine the condition of the existing floor and determine the amount of labor and materials required to meet requirements and include same in bid.

B. MATERIALS

1. Carpet Tiles: Shaw Contract – 24” x 24” Modular Carpet Tiles;
   a. Style: “Intent” 5T208
   b. Color: To be selected by Architect from complete range of colors.
2. Product
   a. Construction: Multi-Level Patterned Loop
   b. Face Fiber: Eco Solution q nylon
   c. Dye Method: 100% Solution Dyed
   d. Gauge: 1/10 inch
   e. Tufted Yarn Weight: 14 oz. / yd2
   f. Stitches per Inch: 10.00
   g. Primary Backing: Synthetic
   h. Secondary Backing: “Strataworx tile”
   i. Adhesive: Manufacturer’s recommended adhesive.
   j. Filler: Latex emulsion type compatible with carpet adhesive.
   k. Installation Pattern: To be selected by Architect prior to start of installation.

C. SAMPLES

1. Three (3) full samples of carpet tile selected shall be submitted for approval, after original color selection is made.
2. Sample pieces of carpet reducers, edging, joiners, etc. 1'-0" in length shall be submitted by carpet subcontractor for approval prior to installation of any of the material.

D. LOCATION AND MEASUREMENT

1. Carpeted areas are indicated on drawings.
2. Dimensions indicated on the drawings are from the best available data. The carpet contractor shall verify all dimensions and other conditions affecting his work prior to submitting his bid. The contractor shall be responsible for proper installation of carpet in areas designated.

E. INSPECTION AND PREPARATION OF SUBFLOORS

1. The Carpet Contractor shall inspect the subflooring before starting work, and shall notify the Architect in writing of any condition which will prevent him from satisfactorily completing his work. Do not proceed with any work until such defects are entirely corrected.

2. The Carpet Contractor shall perform such preparation as necessary and noted herein and on Drawings to provide a satisfactory substrate for installation of carpet. The application of carpet by the Carpet Contractor shall be an indication of his acceptance of the subfloor.
3. Preparation shall include filling of cracks in concrete subfloors with filler and other operations necessary to obtain a satisfactory base for carpet installation.
4. The Carpet Contractor shall broom clean, treat and damp mop floors prior to application of adhesive. Floors shall be thoroughly dry before any adhesive is applied.

F. DELIVERY AND STORAGE
1. The Carpet Contractor shall be held responsible for the scheduling, receiving and placement of goods where directed by Architect.
2. Goods shall be delivered to the job site in the manufacturer's bundles and shall be clearly marked as to size, dye lot and materials.
3. Carpet shall be covered and protected from soiling and damage.

G. INSTALLATION
1. Recommended procedures for installation shall be furnished by the Carpet manufacturer. Unsatisfactory installation resulting from work performed not in accordance with the manufacturer's recommendation shall be the responsibility of the Carpet Contractor and may result in removal and relaying of carpet at the expense of the Contractor or installer. Particular attention should be paid to recommendations for application of adhesives.
2. The Carpet Contractor shall carefully check all dimensions and other conditions in the field and shall be responsible for proper fitting of carpet in areas designated.
3. Edge Trim, if any, shall be secured to floor so there is no possibility of them coming loose.
4. Upon completion of any one area carpeting shall be cleaned of all foreign material, with a commercial type vacuum and neatly trimmed of all protruding fibers, loops, etc.
5. Extra Stock: Furnish to Owner minimum of 10% extra stock of carpet tiles in un-open cartons.

I. CLEAN-UP
1. Spots and smears of floor and seam cement shall be removed immediately with solvent recommended by carpet manufacturer. After installation is completed remove any spots with suitable spot remover, remove all cuttings, vacuum carpet and leave clean and perfect.

J. GUARANTEES
1. The Manufacturer shall unconditionally guarantee that the carpet samples registered and the carpet he proposes to furnish meet or exceed the Specifications for material herein specified in every detail.
2. Furnish a written guarantee, in duplicate, which guarantee shall cover a period of one (1) year from and after the completion of the carpet installation and its acceptance by the Owner.

END OF SECTION 09 68 13

SECTION 09 91 23 – PAINTING

A WORK INCLUDED

1. The work under this section includes the furnishing of all labor, material, equipment, appliances, and tools to perform the work indicated on the Drawings or specified herein including, but not limited to the following:
   a. Painting
   b. Preparation of surfaces for painting.

B. WORK EXCLUDED

1. The following listed work is included under other sections:
   a. Shop coat on miscellaneous iron and steel.
   b. Factory finish on exterior metal.
   c. Prime coat on new hollow metal work shall be furnished under the Hollow Metal Section.

C. REFERENCES

1. Society for Protective Coatings (SSPC)
   a. SSPC-SP 1 - Solvent Cleaning
   b. SSPC-SP 2 - Hand Tool Cleaning
   c. SSPC-SP 3 - Power Tool Cleaning
   d. SSPC-SP 7 – Brush-off Blast Cleaning
2. Environmental Protective Agency (EPA)
   a. EPA-Method 24
3. American Society of Testing and Materials (ASTM)
   a. ASTM D3960-04 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
   b. ASTM D6886 - Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography.

D. SUBMITTALS

1. Submit under provisions of General Conditions and Division 1.
2. Product Data: Manufacturer's data sheets on each paint and coating product to be used, including:
   a. Product characteristics.
   b. Preparation instructions and recommendations.
   c. Primer requirements and recommendations.
   d. Storage and handling requirements and recommendations.
   e. Application methods.
   f. Cautions, VOC's.
3. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and sheens.

E. QUALTIY ASSURANCE

1. VOC Content: Determine VOC (Volatile Organic Compound) content of solvent borne and waterborne paints and related coatings in accordance with EPA Method 24 or ASTM D3960.

F. DELIVERY, STORAGE AND HANDLING

1. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information:
   a. Product name, and type (description)
   b. Application & use instructions

c. Surface preparation
d. VOC content
e. Environmental issues
f. Batch date
g. Color number/name

2. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.
3. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

G. MATERIALS

1. All finished materials, thinners, etc., shall be the best quality, first line materials as manufactured by:
   a. Benjamin Moore
   b. The Glidden Company
   c. Harrison Paint Co.
   d. ICI Dulux
   e. Pittsburgh Paints - PPG
   f. Pratt and Lambert, Inc.
   g. The Sherwin-Williams Company
2. All paint materials shall be delivered to the job in the manufacturer's original unopened labeled containers, and they shall be used strictly in accordance with the manufacturer's directions.
3. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such a procedure is specifically described in manufacturer's product instructions. VOC numbers used in this document need to be confirmed by using the products MSDS sheets.

H. APPLICATIONS/SCOPE

1. Scope: Use products specified in this section to finish ALL interior and exterior surfaces exposed to view, unless otherwise indicated; DO NOT PAINT THE FOLLOWING:
   a. Items specified or provided with factory finish; materials and products having factory-applied primer are not considered factory finished.
   b. Items indicated to receive other finishes.
   c. Items indicated to remain unfinished.
   d. Marble, granite, slate, and other natural stones.
   e. Brick, concrete, cast stone.
   f. Glass.
   g. Stainless steel, anodized aluminum, bronze.
   h. Equipment nameplates, fire rating labels, and operating parts of equipment.
   i. Concealed pipes, ducts, and conduits.
2. Exterior Surfaces to be Painted:
   a. CMU
   b. Hollow metal doors and frames.
3. Interior Surfaces to be Painted:
   a. Hollow metal doors.
   b. Hollow metal frames.
   c. Gypsum board, concrete masonry walls, ceilings, soffits, bulkheads, and columns.
   d. Steel columns, beams, joists, deck; bare metal, primed metal, and galvanized metal – all metal exposed to view, regardless of location.

e. Pipes, ducts, conduits, hangers and supports, equipment, and equipment enclosures exposed to view in all rooms and spaces.
f. Access panels and equipment cabinets.

4. Colors: To be selected by Architect from manufacturer's full range of available colors. See item J below.

I. EXTERIOR AND INTERIOR PAINT SPECIFICATIONS

1. If these Specifications conflict with the recommendations of the manufacturer, this discrepancy shall be brought to the attention of the Architect, to decide which method shall be followed.
2. Raw linseed oil, turpentine, benzine, gloss oil, or coal oil shall not be used in any of the materials for interior work. Any thinner used shall be subject to the provisions stated above.
3. All Surfaces To Be Painted, Unless Otherwise Specified:

a. Concrete Masonry Surfaces (Semi-Gloss): (Lower Odor/Low VOC Vinyl Acrylic Latex System)
   1. Primer: Waterborne Vinyl Acrylic Block Filler - (16 mils wet, 8 mils dry)
   2. Two (2) Finish Coats: Waterborne Vinyl Acrylic Semi-Gloss (4 mils wet, 1.6 mils dry per coat)

b. Concrete Masonry Surfaces (Semi-Gloss): (Lower Odor/Low VOC Epoxy System)
   1. Primer: Waterborne Epoxy Block Filler - (16 mils wet, 8 mils dry)
   2. Two (2) Finish Coats: Waterborne Semi-Gloss Catalyzed Epoxy - (2.5 - 3 mils dry per coat)

c. Exterior Concrete Masonry Surfaces
   1. Primer: Vinyl Acrylic Block Filler - New CMU walls shall have two (2) coats of block filler.
   2. Two (2) Finish Coats: Exterior 100% Acrylic Latex Flat (0-5 units at 85 degrees F.), 1.2 mils DFT/coat.

d. Metal – Ferrous (Semi-Gloss): (Lower Odor/Low VOC Waterborne Acrylic Latex System)
   1. Primer: Waterborne Acrylic Metal Primer - (5-10 mils wet, 2-4 mils dry)
   2. Two (2) Finish Coats: Waterborne Acrylic Latex, Semi-Gloss - (4 mils wet, 1.4 mils dry per coat)
   3. Surfaces: Structural Steel Columns, Joists, Trusses, Beams, Miscellaneous & Ornamental Iron, Structural Iron, Ferrous Metal.

e. Gypsum Board (Egg-Shell): (Lower Odor/Low VOC Acrylic Latex System)
   1. Primer: Vinyl Acrylic Latex - (4 mils wet, 1.3 mils dry per coat)
   2. Two (2) Finish Coats: Modified Alkyd Egg-Shell - (4 mils wet, 1.6 mils dry per coat)
   3. Surfaces: Ceilings and bulkheads.

f. Gypsum Board (Semi-Gloss): (Lower Odor/Low VOC Acrylic Latex System)
   1. Primer: Vinyl Acrylic Latex - (4 mils wet, 1.5 mils dry per coat)
   2. Two (2) Finish Coats: Vinyl Acrylic Semi-Gloss - (4 mils wet, 1.6 mils dry per coat)
   3. Surfaces: Gypsum Wallboard Walls

g. Gypsum Board (Semi-Gloss): (Lower Odor/Low VOC Epoxy System)
   1. Primer: Waterborne Epoxy Primer - (4 mils wet, 1.5 mils dry per coat)
   2. Two (2) Finish Coats: Waterborne Catalyzed Epoxy Semi-Gloss - (2.5 - 3 mils dry per coat)

J. COLOR SAMPLES

1. Colors will be selected by the Architect from the manufacturer's standard colors. Final colors must match exactly with the approved sample.
2. Colors shall be chosen by Architect for each of the following surfaces:
   a. Exterior CMU.
   b. Interior CMU.
   c. Steel columns
   d. Steel joist and deck.
   e. Exterior steel doors and frames.

f. Interior steel doors and frames.
g. Interior steel frames.
h. Gypsum drywall walls, ceilings, bulkheads and soffits.
i. Louvers and Vents
j. Plumbing, Mechanical and Electrical equipment and access panels.

3. Contractor shall include in his Base Bid, the following sample paint areas:
   a. Four (4) wall sample paint colors – 50 square feet each.

K. STORAGE

1. Store materials where directed by the Architect. Oily rags, waste and empty cans shall be removed from the building each night. They shall not be kept in unventilated rooms, and they shall not be permitted to accumulate.
2. Proper fire extinguishers shall be placed near storage area.

L. PROJECT CONDITIONS

1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not apply coatings under environmental conditions outside manufacturer's absolute limits. This specification does not take into consideration wet areas or areas needing high performance coatings.

M. EXAMINATION

1. Do not begin application of coatings until substrates have been properly prepared. Notify Architect of unsatisfactory conditions before proceeding.
2. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
3. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

N. PROTECTIONS

1. Before applying any paint, cover and protect all finished surfaces and equipment with clean drop cloths or with heavy gauge visqueen as directed. All surfaces or equipment discolored or otherwise damaged under this section, shall be repaired or replaced at no expense to the Owner.
2. Place “fresh paint” signs in conspicuous places at all unguarded points where fresh or undried paint occurs.
3. Use no plumbing fixture or pipe whatsoever for disposing of waste or mixed materials.

O. PREPARATION

1. Painting Contractor shall provide adequate light in all areas of painting.
2. All coats to be applied at proper temperature, in accordance with coating manufacturer’s printed recommendations.
3. All surfaces to receive finish coatings shall be prepared in accordance with coating manufacturer’s printed recommendations, including methods of cleaning and acceptable surface conditions.
4. Do not apply to wet or damp surfaces.
   a. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer’s procedures to apply appropriate coatings prior to 30 days.
5. Unpainted and shop coated steel and iron shall be washed clean with Pratt and Lambert Duosol Reducer. Remove any rust which may have formed and spot prime.
6. Galvanized metal shall be cleaned thoroughly with Pratt and Lambert Duosol.
7. Drywall imperfections shall be spackled and sanded smooth. Nail holes, splits or scratches shall be puttied or spackled smooth after the prime coat.
8. The Painting Contractor is completely responsible for the satisfactory condition of his finished work. He

shall notify the Architect if he considers any surface unsuitable for a proper finish. The starting of work by this Contractor will be considered as evidence that all surfaces are acceptable to him.

P. INSTALLATION/WORKMANSHIP

1. No exterior painting shall be done in rainy or freezing weather and no painting shall be done in dirty or dusty surrounding.
2. Mix and thin coatings according to manufacturer's printed recommendations.
3. All work shall be done by skilled mechanics. Application method shall be as recommended by manufacturer for type of surface.
4. All materials shall be applied and cut in neatly so as to dry uniformly to the color and sheen specified, free from runs, sags, wrinkles, shiners, streaks, and brush marks.
5. All materials shall be applied in accordance with the manufacturer's printed directions. Minimum drying time between coats shall be as specified by the manufacturer.
6. Paint top and bottom edges of all doors the same as the vertical surfaces after hardware and doors are fitted.
7. Dark Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
8. Protect finished coatings from damage until completion of project.
9. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that affect the performance of the coatings.
10. This Contractor shall remove all paint spots, rags, and discarded material from the areas in which he has been conducting his work and shall leave these spaces clean and orderly.

END OF SECTION 09 91 23

SECTION 10 44 16 - PORTABLE FIRE EXTINGUISHERS

A. DESCRIPTION OF WORK

1. Furnish and install portable fire extinguishers and cabinets at locations shown on plans.

B. QUALITY ASSURANCE

1. Unless otherwise acceptable to the Architect, furnish portable fire extinguishers and accessories by only one manufacturer.
2. Provide portable fire extinguishers manufactured by one of the following:
   a. W. D. Allen Mfg. Company
   b. General Fire Extinguisher Corp.
   c. Walter Kidde and Company
   d. Larsen's Mfg. Company

C. SUBMITTALS

1. For information only, submit two copies of manufacturer's technical data and installation instructions for all portable fire extinguishers and cabinets required. Transmit copy of each instruction to the installer.

D. MATERIALS

1. Fire Extinguishers:
   a. Provide fire extinguishers for each extinguisher cabinet and other locations as shown on the Drawings. Furnish only new fire extinguishers which are approved and labeled by Underwriter's Laboratories.
   b. Provide colors and finishes of materials for portable fire extinguishers as selected by the Architect from manufacturer's standard.
   c. Multipurpose dry chemical: 10 lbs. capacity, enameled steel container with pressure- indicating gauge, for Classes A, B, and C fires.
2. Fire Extinguisher Cabinets:
   a. Provide fire extinguisher cabinets suitable for housing one of the size fire extinguishers specified above, unless otherwise indicated as follows:
      1. Semi-recessed 2-1/2" rolled edge trim for shallow wall installation.
      2. Box: 20 gauge.
      3. Trim frame: 18 gauge.
      4. Tubular door perimeter frame: 20 gauge.
      5. Door Panel: Bubble type, one piece molded clear plastic with catch.
      6. Construction: One piece tubular door frames, mitered and welded. One piece metal trim frame, to suit cabinet style required. Weld all joints and grind smooth. Provide manufacturer's standard steel box with white baked enamel interior finish and primed exterior finish.
      7. Steel door frame and trim: Manufacturer's standard, prime coat finished, steel door frame and trim style as specified.
      8. Door hardware: Continuous type hinge permitting door to open 180 degrees. Provide either lever handle with cam action latch, or door pull and friction latch.

E. EXECUTION

1. Installer must examine the substrate and conditions under which the fire-fighting devices are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
2. Install in locations and at mounting height to comply with governing authorities. Securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.

END OF SECTION 10 44 16

SECTION 11 12 33 - VEHICULAR SLIDE GATE OPERATOR

A. SUMMARY OF WORK

1. Furnish and install a complete microprocessor based vehicular slide gate operator system, with a solid-state board to control all functions of the slide operator, as described herein and shown on the plans. Include all necessary boards, power supplies, loop detectors, connectors, and accessories for a complete operational system.

B. CONTRACT DOCUMENTS

1. All equipment and work specified in this section shall comply, with all the General Conditions of the specifications, contract documents, and drawings as indicated.

C. RELATED WORK

1. Parking control contractor shall coordinate all work with other contractors and trades where necessary.
2. All necessary conduit, raceways and pull boxes shall be installed by the electrical contractor.
3. Installation of the vehicular slide gate operator system shall be coordinated with the installation of other parking control related systems.

D. QUALITY ASSURANCE

1. Installation shall comply with all applicable codes.
2. All equipment shall be new, in current production, and the standard products of a manufacturer of vehicular gate operator equipment.
3. If required, manufacturer shall be able to demonstrate features, functions and operating characteristics to the Owner.
4. System shall be installed by a factory authorized contractor, with technicians specifically trained in this system.
5. On-site maintenance and repair service shall be available locally and within four (4) hours of notification for emergency condition.

E. REFERENCE STANDARDS

1. Vehicular Slide Gate Operator shall be in compliance with the following tests and standards:
   a. Underwriter Laboratories Inc. (UL) Standard for Safety - Door, Drapery, Gate, Louver and Window Operators and Systems, UL 325 Fourth Edition
   b. Underwriters Laboratories Inc. (UL) Standard for Safety - Tests for Safety-Related Controls Employing Solid-State Devices, UL 991 Second Edition.
   c. Test in accordance with UL 325 and UL 991.

F. SUBMITTALS

1. Provisions: Comply with Section 01 30 00 SUBMITTALS.
2. Include an equipment list, data sheet(s), system description, block diagrams on equipment to be furnished and electrical wiring diagrams for installation.
3. Include all data necessary to evaluate design, quality and configuration of proposed equipment and system(s).

G. WARRANTY

1. Systems shall include a factory warranty that equipment is free from defects in design, material, manufacturing and operation.
2. Factory warranty period shall be for two (2) years parts and workmanship, from date of acceptance.
3. Installing contractor shall guarantee the equipment, wire and installation for 12-months from date of acceptance.

H. ACCEPTABLE MANUFACTURERS

1. The system as described herein, is based on the Model 9150 Vehicular Slide Gate Operator system, manufactured by DoorKing, Inc., Inglewood, California. The vehicular slide gate system specified meets requirements of the specifications and shall be considered as the acceptable Base Bid.

I. SYSTEM DESCRIPTION

1. Technical Data:
   a. The slide gate operator shall use a microprocessor based solid-state control board that controls all functions of the operator. The slide gate operator shall include two (2) convenience outlets, built-in power switch and built-in reset switch.
      1. Model 9150:
         a. Industrial (Class III) applications.
         b. Maximum gate length is 30-feet, maximum gate weight is 1000 lbs. with 1 / 2 HP motor.
         c. 1 / 2 HP continuous duty motor operates at 115 volt.
         e. Typical current draw for the 1 / 2 HP motor is 5.4 amps at 115 V.
         f. Primary reduction and power transfer is provided by single cog belt drive train.
         g. Adjustable clutch.
         h. The pulling medium consists of #40 roller chain.
   b. Amperage ratings are nominal under load.
   c. The gate operator speed is set at 1 foot per second.
   d. Operator housing is 12-gauge G90 galvanized steel and aluminum painted charcoal gray.
   e. The gate operator shall have two convenience outlets available for accessory transformer power, and also have a built-in lockable power disconnect and reset switch.
   f. A positive dead bolt shall operate in a fail-safe mode, i.e.: only when the gate is forced open, to reduce solenoid lock wear and failure, or be capable of operating in a fail-secure mode, i.e.: after each operation.
2. Control Circuit:
   a. The slide gate operator shall use model 4602 microprocessor based control board, or equal.
   b. An adjustable timer shall be built into the control board to allow the gate to automatically close.
   c. Operator shall allow a stop, or a stop and reverse function (settable) from a safety related input.
   d. Control board shall have two ports for plug in of loop detectors.
   e. A dry set of relay contacts shall be available for external use, and shall have four programmable functions.
   f. A special input shall allow the gate to be partially opened.
   g. A timer override function shall cause an opening gate to stop and then reverse direction when the reverse loop(s) or reverse input is clear even if the gate has not reached the full open position, to help reduce tailgating.
   h. Control board shall have separate inputs for external contact and non-contact entrapment protection devices.
   i. Functions will be user programmable by DIP-switches located on the control board.
3. Inherent Reverse:
   a. The gate operator shall be designed in such a way that if an obstruction is met during the opening or closing cycles, the gate operator will automatically reverse the gate.
   b. For enhanced safety, the control board shall check the primary entrapment sensing system circuit at each cycle of the operation. Should the control board detect a fault in the system, the motor shall not be allowed to start.
   c. This reverse system shall be inherently designed into the operator so that if the external reverse devices fail or become inoperative, the operator will still have the capability to sense the obstruction and reverse the gate.

d. The inherent reverse system in the gate operator shall consist of a primary sensing system that will reverse the gate if an obstruction is sensed. Should the primary system fail or become inoperative, a secondary inherent system will sense the obstruction and reverse the gate.
e. The primary system shall sense a slow down of gate travel speed and reverse the gate.

4. Entrapment Protection
   a. The gate operator shall stop and activate the internal alarm upon sensing an entrapment (two sequential activations of the inherent sensing system) and shall require activation of the reset switch prior to returning to normal operation, as required by UL 325 safety standard.
   b. For enhanced safety, the operator shall upon sensing an entrapment, release pressure on the gate and shall assume a fail-safe condition to allow any entrapment the opportunity to free itself without the need of outside intervention.
5. Manual Release
   a. The gate operator shall incorporate a "fail-safe" design that will allow manual operation of the gate from either the inside or the outside without the need of any hand cranks, keys or other mechanical devices, as the primary manual release device.
   b. The manual release device shall be affixed to the operator and be capable of being quickly operated in an entrapment situation.
      1. The release must be an integral (non-removable) part of the operator.
      2. A single non-repetitive movement shall cause an action that will allow the gate to be manually operated.
      3. The manual release or manual operation of the gate shall not result in a risk of injury to persons if the operator is activated while the manual release is activated or being used.

J. <u>EQUIPMENT</u>

1. Vehicular Slide Gate Operator
   a. Dimensions: 24 inches high, 15 inches wide, 16-1/2 inches deep. Actual footprint: 18 inches wide, 16-1/2 inches deep.
   b. Weight: Approximately 125-185 pounds.
2. Accessory Equipment:
   a. Loop Detectors: Single channel loop detectors plug into main control board and prevent the gate from closing on vehicular traffic.
   b. Photo-cells: Non-contact sensors are used as secondary entrapment protection devices and prevent gate from closing on persons or vehicles.
      1. Photo-reflective beam, 30 foot sensing distance.
   c. Digital Keypads: Manufacturer's standard digital keypad.
      1. Stand-alone keypad manufactured for outdoor applications and vandal resistance.
3. A complete operational system shall be provided.

K. <u>INSTALLATION</u>

1. All installation work shall be performed by qualified technicians who have been factory trained and certified.
2. Installation to be mounted directly to a concrete pad or post mounted, firmly secured, plumb, and level.
3. Wiring shall be uniform and in accordance with national electric codes and manufacturers instructions.
4. Equipment shall be mounted directly to a concrete pad.
5. All splices shall be in easily accessible junction boxes or on terminal boards.
6. All cable runs in all junction boxes shall be tagged and identified.
7. Coordinate all work with other affected trades and contractors.

L. SYSTEM INITIALIZING AND PROGRAMMING
1. System shall be turned on and adjustment made to meet requirements of specifications and on-site conditions.
2. System shall function as specified.

M. SYSTEM TEST PROCEDURES
1. System shall be completely tested to assure that all components, and accessories are hooked-up and in working order.
2. System shall be pre-tested by contractor and certified to function in accordance with plans and specifications.
3. System shall be tested in presence of owner's representative.

N. OWNER INSTRUCTIONS
1. Installation contractor shall conduct up to (1) hour of instruction in use and operation of the system to designated owner representatives, within (30) days of acceptance.
2. Installation contractor shall conduct up to (1) hour of technical training, in troubleshooting and service of the system, to designated owner representatives within (90) days of system acceptance.

O. MANUALS AND DRAWINGS
1. Contractor shall provide owner with (2) copies of standard factory prepared operation, installation and maintenance manuals. Manuals shall include typical wiring diagrams.
2. Contractor shall provide owner with (2) copies of any risers, layouts, and special wiring diagrams showing any changes to standard drawings, if required on project.

END OF SECTION 11 12 33

SECTION 12 21 13 - ALUMINUM WINDOW BLINDS

A. WORK INCLUDED

1. Furnish and install aluminum window blinds for all windows as shown on drawings and specified in this section.

B. RELATED WORK

1. Unit Masonry – Section 04 20 00
2. Aluminum Storefront - Section 08 41 13
3. Gypsum Board Assemblies – Section 09 21 16

C. SUBMITTALS

1. Contractor shall submit shop drawings, finish samples, test reports, and warranties per Division 1 General Requirements.
2. Submit manufacturer's product literature, including installation instructions.
3. Submit actual color samples for selection by Architect.

D. STANDARDS

1. American Society for Testing and Materials (ASTM)

E. WARRANTY

1. Horizontal blinds shall be covered by the manufacturer's limited lifetime warranty.
2. Head rail shall be covered by the manufacturer's five (5) year commercial warranty.
3. Furnish a written warranty against defective workmanship that may occur within one (1) year from date of installation.

F. PRODUCT HANDLING

1. Deliver all blinds and accessories in manufacturer's original packages, bearing the manufacturer's name, brand and model.
2. Keep materials dry. Store blinds in a manner to avoid damage.

F. PRODUCTS

1. Horizontal Aluminum Window Blind Systems:
   a. Standard specified shall be Hunter Douglas Contract Micro 5/8: Aluminum Blinds (Model CM82).
2. Slats
   a. Aluminum alloy 6011, heat treated and spring tempered.
   b. 5/8" wide x .008" thick, before painting.
   c. Finish shall be painted solid color with "Dust Shield" finish.
   d. Color shall be selected by Architect, from manufacturer's full range of standard colors.
3. Headrail
   a. Headrail shall be 1" x 1" x .024" steel treated to resist corrosion, formed into a U-shaped profile with rolled edges, coated with baked-on polyester finish to match slats.
   b. Hardware shall be enclosed in the headrail.
4. Tilt Wand
   a. Tilt wand shall be extruded, clear acrylic with tubular construction.
   b. Wand shall be ribbed, 9/32" diameter, and detachable without tools.
5. Bottom Rail
   a. Bottom rail shall be steel, treated to resist corrosion, with baked-on polyester paint color, coordinated to slats.
   b. Rail shall be formed with a double lock seam into a closed oval shape for optimum beam and torsion strength.

c. Color coordinated thermoplastic end caps.
d. Rail shall accept hold-down pins to secure the bottom rail to jamb or sill.

G. EXECUTION

1. Inspection
   a. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface and are in accordance with approved shop drawings. Notify Architect in writing of any conditions detrimental to the proper and timely completion of the installation; proceed with installation only when conditions have been corrected, and are acceptable to the installer.
   b. Blind installer shall field verify all openings to ensure a proper fit.
2. Installation
   a. Use only skilled tradesmen. Complete work in accordance with approved shop drawings and specifications.
   b. Blind installation shall be completed after all painting work is complete.
   c. Blinds shall be installed at all exterior window locations.
   d. Prior to acceptance of the work, clean blinds and adjust for proper operation.
   e. Replace all slats or parts that have been damaged, or do not operate properly.

END OF SECTION 12 21 13

SECTION 210100 - FIRE PROTECTION GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to this Division's Supplemental General Provisions for additional Project requirements.

B. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates and Addenda are a part of this Specification. Contractors and Subcontractors shall examine these provisions as they may affect work under this Division.

C. Contractor shall examine Division 1 Contract Documents for general project requirements.

D. Contractor shall also examine the Contract Documents of all Divisions which may affect and require work under this Division and be responsible for all work required under this Division.

1.2 DESCRIPTION OF WORK

A. This project involves work in an existing operating facility and will require close communication with Owner with regard to access and work hours. Coordinate all work schedules prior to bidding with Owner. When project includes a Construction Manager, all work schedules shall also be coordinated with the Construction Manager, prior to bidding.

B. All Drawings as well as the Specifications for all Divisions shall be defined as the Contract Documents. Contractor shall review entire set of Contract Documents prior to bidding.

C. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both the Specifications and the Drawings.

D. Prior to submitting bid, Contractor shall examine all Drawings and Specifications to develop a complete understanding of the project scope. Contractor shall ask for clarifications during the pre-bid phase of the project. Failure to do so will not relieve the Contractor of their responsibility to perform all required work.

E. Where the project scope involves renovations and additions, it is required that Contractors visit the site of the work and become familiar with the conditions affecting the installation. Submission of a Bid shall presuppose knowledge of such conditions and no additional compensation shall be allowed where extra labor or materials are required because of the lack of knowledge of these conditions.

F. Bid shall include any special phasing requirements related to the construction work as described in the Contract Documents. Coordinate with Division 1.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation shall be considered applicable. In the event that such interferences occur in course of the work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences that may occur during the course of construction shall be brought to the immediate attention of the Architect and Engineer, and the Architect and Engineer's decision, confirmed in writing, shall be final.

H. The following general terms as used within the context of the Contract Documents shall be defined as follows:

1. "Contract Documents" - The complete set of Drawings and Specifications for all Divisions included in the project.
2. "Drawings" - Drawings furnished as part of the Contract Documents.
3. "Contractor" - This Division's Contractor and the Subcontractors to this Division's Contractor.
4. "Responsible" - To perform work required.
5. "Furnish" - To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" - Work which includes the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" - To furnish and install, complete and ready for the intended use.
8. "Equal" - To meet or exceed the standards of the specified products or listed manufacturers.
9. "Mechanical" - HVAC, Plumbing and Fire Protection Divisions as applicable.

1.3 WORK INCLUDES

A. Include all labor, material, equipment, services, coordination, supervision and administration necessary for the proper completion of all work shown. Items omitted, but necessary, to make all systems complete and workable shall be understood to form part of the work.

B. Material for work required to complete installation such as earthwork, concrete, masonry, mortar, reinforcing steel, patching and painting shall be provided as specified in other applicable Divisions covering such work.

C. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Include all testing, test reports, system programming, start-up reports and warranties for each system as outlined elsewhere in these Specifications. Refer to "Operating and Maintenance Manuals" for additional requirements.

1.4 ALTERNATES

A. Refer to this Division's Supplemental General Provisions for a description of alternates.

1.5 PERMITS AND FEES

A. Secure and pay for permits and inspections required for all work related to this Division. Turn over certificates of approval to the Owner or Construction Manager promptly when received, and before payment is made for the work.

B. Give proper authorities notice as required by law relative to the work in their charge. Comply with the regulations regarding temporary enclosures, obstructions or excavations and pay all legal fees involved.

1.6 QUALITY ASSURANCE

A. Work shall be installed in accordance with provisions of all applicable codes, as interpreted by the local Authority Having Jurisdiction (AHJ), as well as any further modifications or regulations published by local or State Authorities.

B. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

C. The following building codes with amendments shall be followed:

1. Ohio Building Code
2. Ohio Fire Code

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Testing and Material (ASTM)
3. Americans with Disabilities Act (ADA) - Americans with Disabilities Act Accessibility Guidelines (ADAAG)
4. Federal Occupational Safety and Health Act (OSHA)
5. NFPA Standards as referenced by the Building Codes.
6. Authority having jurisdiction

1.7 ELECTRONIC MEDIA

A. Electronic drawing files are available to the Contractor from the Engineer for coordination purposes as defined in Division 0 and Division 1.

B. Contractor shall deliver closeout documents on a portable memory device. Portable memory device shall refer to CD, DVD, Flash Drive, external hard drive or any other portable media used for storing electronic files.

1.8 SUBMITTALS

A. Conform to submittal requirements outlined in Division 1 Specifications. Provide Submittals in an electronic format. The file format shall be portable data file (.pdf).

B. Submittal transmittal shall list corresponding Specification Section and a description of item(s) being submitted. Each submittal shall only include items from one Specification Section. Submittals which include items from multiple specification sections will be returned "REVISE AND RESUBMIT."

C. Prepare Submittals with adequate details and dimensions as necessary to clearly show construction. Clearly identify each item on the submittal with designation as indicated on Drawings including location and use. Include with Submittals Manufacturers published descriptive literature, specifications, performance data (normal operating characteristics, curves, ratings, etc.), wiring diagrams and installation instructions. Indicate for each item the operating characteristics, design conditions, features, and optional items that are intended for application on this project. Where contents of Submittal literature include data not pertinent to the Submittal, clearly indicate (highlight) which portion of content is being submitted for review.

D. Contract Documents include scheduled equipment which is the Basis of Design and used to establish design and space requirements. Contract Documents may also include alternative acceptable manufacturers. Where alternative manufacturer's equipment is submitted which alters the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with deviations from the Basis of Design shall be borne by the Owner.

E. If for any reason, the Submittal shows variations from the requirements of the Contract Documents, the Contractor shall make mention of such variation in the letter of transmittal. The Contractor shall note in red on the Submittal any change in design or dimension on the items submitted including changes made by the Manufacturer which may differ from catalog information.

F. Where additional installation drawings, wiring diagrams or other drawings are specified elsewhere as part of the project requirements, they shall be submitted at the same time as the Submittals. Partial Submittals are not acceptable.

G. Contractor shall review each Submittal prior to submission, and check for compliance with the Contract Documents. Corrections shall be noted. Mark with approval stamp prior to submission. Submittals that do not bear the Contractor's approval stamp will be returned without action.

H. The Submittals will be reviewed only for General compliance and not for dimensions, quantities, etc. The responsibility of correct procurement remains solely with the Contractor. The Submittal review shall not relieve the Contractor of responsibility for errors or omissions and deviations from the Contract Document requirements. Submittals which are not required under this Division shall be returned to the Contractor.

I. Where Submittal review format, whether hard copy or software based, includes pre-determined language that includes the word "Approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" or similar verbiage shall be defined as "Reviewed, Exceptions as Noted".

J. After review of submittals by the Engineer, the Contractor shall revise and resubmit if required to establish compliance with the Contract Document requirements. Resubmittal shall include a document with a written response to each of the Engineer's previous comments.

K. The Contractor shall notify the Engineer when all product data and/or shop drawings for all equipment, materials and systems have been submitted for review.

L. The Contractor agrees that Submittals, processed by the Engineer, are not change orders; that the purpose of submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design intent of the project. This understanding is demonstrated by indicating which equipment and material is required, and by what methods of fabrication and installation will be utilized.

M. The Contractor further agrees that if deviations, discrepancies or conflicts between the Submittals and the Contract Documents are discovered, either prior to or after Submittals are processed by the Engineer, the Drawings and Specifications shall control and shall be followed.

N. Final reviewed submittals shall be included in the Operating and Maintenance Manuals. Where Submittals are returned "REVIEWED, EXCEPTIONS AS NOTED", the final Submittals shall be updated to include the exceptions. Upon ordering equipment, order sufficient number of sets of product data literature for the Operating and Maintenance Manuals.

1.9 GUARANTEE AND WARRANTIES

A. Warrant that equipment and all work is installed in accordance with good workmanship practice. All equipment shall be installed in accordance with the Manufacturer's recommendations and shall meet the requirements specified. Any equipment failing to perform or function as specified shall be replaced with complying equipment without cost to the Owner. Warranty shall commence upon acceptance of substantial completion of construction by the Owner. Sign-off of individual equipment start-up procedures shall not activate the warranty commencement.

B. Guarantee against defects in workmanship and materials; repair or replace any defective work, material or equipment within one year from date of formal written warranty commencement. Longer product warranties provided by individual equipment manufacturers shall supersede this one year guarantee; however, the Contractor shall maintain the one year workmanship and materials guarantee for installation of such equipment. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall consist of updated shop drawings as defined elsewhere in the Specifications. Refer to Division 1 for quantities, special formatting, and additional requirements.

2. The Contractor shall produce updated shop drawings electronically from the original shop drawings in an approved format. Updated CAD drawings shall include any deviations or changes made during construction. At the end of the project, the Contractor shall transfer the electronic drawings onto a portable memory device. Both hard copy drawings and the portable memory device shall be provided as Record Drawings.
3. After the project is completed, the Record Drawings shall be delivered to the Architect/Engineer for inclusion into the Operating and Maintenance Manuals, as a permanent record of the installation as constructed.

1.11 SITE REPORTS AND PUNCHLISTS

A. The Engineer may visit the site periodically during construction and provide written Construction Observation Reports to the Contractor identifying areas where installation does not meet the intent of the Contract Documents. The Contractor shall provide a written response to these reports within 5 business days, indicating the reason the installation is out of compliance with the Contract Documents. After review, the Engineer may or may not require the Contractor to correct the installation. The Contractor shall correct the installation unless the reason for non-compliance is accepted, in writing, by the Engineer or Owner.

B. Final Punch List

1. The Engineer will visit the site to perform a scheduled Final Punch List to identify areas where the installation is incomplete or does not meet the intent of the Contract Documents.
2. If the Engineer is requested to perform the Final Punch List prior to the Contractor being 100% complete with their scope of work, the Contractor shall furnish a Contractor's Completion List, indicating all incomplete work. This list shall be furnished to the Engineer a minimum of 24 hours prior to the scheduled Final Punch List.
3. The Contractor shall respond to each punch list item along with a date, indicating that the item has been completed or corrected.
4. A copy of the Final Punch List with the Contractor's responses shall be included on the Operating and Maintenance Manual.

C. Where on-line documentation management services or project management software requires the author/initiator of a corrective action to close it, and the Engineer is the author/initiator, the following shall apply:

1. When the corrective action is reported as corrected/complete, by either the responsible Contractor or the Construction Manager, the Engineer will assume that the parties responsible for construction have reviewed and approved the correction.
2. By closing the corrective action, the Engineer is in no way approving nor assuming responsibility for the installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials used on this project shall be new and listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, etc.or as approved by the local Authority Having Jurisdiction. Equipment and materials shall be installed or used in accordance with instructions included with the listing or labeling. Where possible, the same brand or manufacturer shall be used for each type of material or equipment. such as.

B. Equipment and materials for the construction shall be the responsibility of the Contractor and shall be protected by the Contractor until formally accepted by the Owner.

C. All Manufacturers of equipment shall verify to the satisfaction of the Contractor and Engineer that their equipment will function properly under the conditions of use, as shown on the Drawings and as specified herein. Dimensions, weights, operating characteristics and all other related appurtenances shall be verified before submittal of shop drawings.

2.2 MATERIAL SUBSTITUTIONS

A. Bids shall be based upon the specified products, suppliers or listed alternatives. The Drawings and Specifications are based on the products specified by type, model, size and suppliers if indicated and thus establish minimum qualities which substitutes must meet to qualify for review.

B. Should the Contractor propose to furnish materials, equipment and/or suppliers other than those specified, submit a written request for substitutions to the Architect or Engineer in accordance with Division 1 requirements. The request shall be an alternate to the original Bid and shall be accompanied with complete descriptive (manufacturer, brand name, catalog number, supplier name and references, etc.) and technical data for all items. Indicate any additions or deductions to the base Bid price.

C. Where substitutions alter the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with the use of a substitution shall be borne by the Owner.

D. Acceptance or rejection of the proposed substitutions shall be subject to approval of the Architect or Engineer. If requested, the Contractor shall submit inspection samples of both the specified and the proposed substitute items for review.

E. In all cases where substitutions are permitted, the Contractor shall bear any and all extra cost of evaluating the equality of the material and equipment to be installed.

F. Where only one Manufacturer or supplier is named in the Contract Documents, the system or equipment shall be provided as specified.

G. Verbal requests or approvals of substitutions shall not be binding on the Architect, Engineer or Owner.

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall follow all safety requirements as defined herein, as described in Division 1 and as defined by Owner safety protocols.

B. Work shall be performed on de-energized equipment in accordance with NFPA 70E.

C. Should suspected hazardous materials be encountered, Contractor shall adhere to procedures, methods and regulations of the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) and immediately notify Owner.

3.2 COORDINATION

A. Take all field measurements necessary and assume responsibility for the accuracy.

B. If any work is fabricated or assembled off-site, assume responsibility for the accuracy of such pre-manufactured assemblies.

C. Install work that is to be concealed within the building construction in sufficient time to secure proper location without delay to the work of other trades.

D. Assume responsibility for location of chases, other openings through masonry and concrete construction. When work cannot be installed concurrent with building construction, arrange for rough-in boxes, sleeves, inserts and other items, as necessary for installation thereof at a later date.

E. If any work is installed so that the architectural design cannot be adhered to, Contractor is responsible for making such changes as Architect may require. Before installing work, report any interferences between work of this Division and work of other Divisions to Architect as soon as discovered. Architect will determine which work must be relocated, or make adjustments to maintain clearances, maximum headroom and to avoid conflict with other work.

F. Become familiar with the construction where work attaches. Review Structural Drawings for coordination of openings. Cut no structural members or slabs without Architect's and/or Structural Engineer's written approval.

G. Exercise caution when working in areas where concealed systems or materials may exist. Any costs for repair of damage incurred shall be the responsibility of Contractor causing the damage.

3.3 PROTECTION

A. All finished surfaces shall be protected from damage and spills during construction.

1. Protect finished floors with a heavy duty flexible fiber reinforced floor protection board - Ram Board or equal.
2. When setting up pipe cutting and threading machines, protect area against staining and abrasion. Provide plywood protection over Ram Board underlayment.
3. Protect finished surfaces from chips and cutting oil by use of a chip receiving pan and oil proof cover.
4. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
5. Protect finished surfaces from paint droppings, insulation adhesive, etc. by use of drop cloths.

B. The Contractor shall provide protection for any roof areas that will be affected by this scope of work. The roof protection shall be positioned such that it provides protection from falling objects such as tools and materials.

C. The cost of correcting any such condition will be charged against the respective Contractor.

3.4 EQUIPMENT INSTALLATION

A. Install equipment in accordance with equipment manufacturer's published installation instructions.

B. Should the Drawings and/or Specifications include procedures that exceed or call for materials that differ from the manufacturer's instructions, the Contractor shall follow the Drawings and/or Specifications. This requirement does not release the Contractor from the obligation to follow all other published instructions and installation recommendations. Contractor shall make Engineer aware, in writing, of discrepancies between the Drawings and Specifications and the manufacturer's published installation instructions, and/or confirm Engineer's design intent, prior to installation of the equipment. Failure to comply may result in reworking the equipment installation or replacement of materials associated with the equipment at no additional cost to the Owner.

3.5 CUTTING AND PATCHING

A. All cutting and patching in construction as necessary for installation of this work shall be the responsibility of this Division and performed by the Tradesmen related to that specific Division of work. Subcontract this work to the appropriate Trade Division.

B. Do not cut any structural member, including but not limited to steel framing and structural floors, without specific permission from the Architect and/or Structural Engineer.

C. Do not cut openings in roof or floor construction without specific permission from the Architect and/or Structural Engineer. Existing roof warranty must be maintained.

D. Where locations of penetrations are inaccurate or where building components are improperly cut by inadequate methods, the Contractor in error shall be responsible for complete repair.

E. The Contractor shall assume responsibility for removing and replacing existing ceiling tiles as required for installation of all work. Areas include that as outlined by the project scope and areas outside the scope where the Contractor is required to make connections to existing systems and install new work. Damaged tiles shall be replaced.

3.6 SERVICE SHUTDOWNS

A. This project involves remodeling of existing areas in an operating facility. Plan work including alterations and connections to existing facilities, to permit carrying on normal building functions. When necessary to temporarily interrupt a service, shutdowns shall be scheduled through the Owner and shall be done at a time as directed by the Owner. No additional compensation shall be allowed for these shutdown periods even though premium time work may be required unless specifically defined in Division 1.

B. Provide temporary service to equipment or systems that cannot be shut down, and as determined by Owner, or as described in the Contract Documents. Remove temporary services when permanent work is completed

C. Provide a minimum of one week notice to the Owner before any service shutdown is scheduled.

3.7 INDOOR AIR QUALITY

A. All occupied areas of building shall remain free from odors, fumes, dust and smoke generated from installation of material and equipment.

B. Arrange with the Owner to schedule isolation of areas where paints, adhesives, solvents, etc., will be used. Areas shall remain isolated until all materials have cured sufficiently as to stop out-gassing of fumes or odors and area has been ventilated to remove all detectable traces of odors and fumes.

C. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas.

END OF SECTION

SECTION 210101 - FIRE PROTECTION SUPPLEMENTAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to 210100: Fire Protection General Provisions for additional Project requirements

1.2 DESCRIPTION OF WORK

A. Modify the existing automatic wet-pipe sprinkler system serving the building. The project area shall be fully protected.

B. Maintain the existing incoming water service.

C. Provide and coordinate a confirming water flow test for the site in accordance with NFPA 291, prior to submitting all hydraulic calculations/shop drawings. Include test results with the submittal.

D. Design and install a hydraulically designed wet-pipe automatic sprinkler system throughout the entire building addition in accordance with NFPA 13, all referenced codes, and the requirements specified within Division 21. The project area shall be fully protected.

E. The existing building is fully sprinklered. The entire existing building is on a single zone. The new building addition shall be an extension of the existing sprinkler zone.

F. Rework existing sprinklers, branch piping, and mains in the renovation area as required to accomodate the new architectural layout. Renovation area shall be fully sprinklered.

G. Provide sprinkler protection as per NFPA 13 for any concealed combustible construction noted in the drawings. Notify the engineer if additional areas of concealed combustible construction are identified during the course of construction.

H. Provide all alarm and supervisory sprinkler system equipment (e.g., flow and tamper switches) for interface with the building fire alarm system. The Contractor shall coordinate these equipment locations with the Fire Alarm Contractor.

1.3 WORK INCLUDES

A. Coordinate all equipment installations with the building architectural and structural features and with the other trades to ensure a complete, supervised, and operational system. Review architectural plans to understand any varying, sloped, and open ceilings, soffits, or bulkheads throughout the building.

B. The Contractor shall become knowledgeable of any phasing plan in place and bid the job accordingly.

1.4 ALTERNATES

A. Division 21 does not have alternates.

1.5 CONTRACTOR QUALIFICATIONS

A. The Contractor shall be licensed by the State of Ohio as a Fire Protection Contractor.

1.6 QUALITY ASSURANCE

A. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

B. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Mechanical Engineers (ASME)
3. American Welding Society (AWS)
4. National Fire Protection Association (NFPA)
5. NFPA 70-2017: National Electric Code

1.7 SUBMITTALS

A. Prior to commencing work, submit product data, hydraulic calculations, and/or shop drawings for Fire Protection equipment, materials and systems as described herein and as required in each individual Division 21 Specification section. If all required submittals are not provided as a consolidated package, provide a schedule detailing the delivery of all required submittals.

B. Provide all Submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.

C. Product data. Submit consolidated product data for all components utilized on the project. Individual components submitted separately will be rejected. Where more than one item, or a specific item with multiple options appear on a single cut sheet, the items shall be specifically indicated. Refer to specific Specification sections for additional requirements.

1. Waterflow Switches
2. Supervisory Switches
3. Sprinkler Heads, Cabinet, Escutcheons, and Guards
4. Flexible Sprinkler Hose and Fittings
5. Piping, Fittings, and Mechanical Couplings
6. Hangers, Inserts, and Supports
7. Test/Drain Assemblies
8. Control Valves
9. Means of Identification of Piping and Valves, Nameplates, Markers, and Tags
10. Ancillary Valves

11. Pressure Gauges
12. Access Doors
13. Firestopping
14. Any other specified system or equipment not listed

D. Samples

1. Provide 2 complete sets of all concealed head cover plates in all standard colors and finishes

E. Water Based Fire Protection Systems

1. Submit shop drawings for all required materials and equipment. Furnish CAD drawings at minimum 1/8 = 1'-0" scale for sprinkler and standpipe systems.
2. Sprinkler system shop drawings shall include all applicable data as required by NFPA-13, Latest Edition, "Working Plans".
3. Submit hydraulic calculations and shop drawings as one consolidated package.
4. Hydraulic Calculations

    a. Data and all relevant drawings shall be submitted indicating hydraulic design calculations, flows, pressures, pipe sizes, and layout of all piping; including the connection of the outside underground to the effective point of the flow test. Calculations and pipe layout shall also be submitted and approved by the AHJ. Provide any and all comments received from the AHJ and resolution thereof to the Professional for record.
    b. Include the allowance for inside hose stream connections at the point of connection. Include the allowance for outside hose streams.
    c. Hydraulic calculations shall be provided for the remote area of each specific hazard class (e.g., Light, Ordinary Group 1, and Ordinary Group 2).
    d. Common piping throughout different sets of calculations shall utilize the same nomenclature.

5. Shop Drawings

    a. Provide Room Names and/or Numbers along with the reflected ceiling layout, including light fixture locations, HVAC diffuser locations, and other ceiling mounted fixtures and devices to verify that the sprinkler system layout has been coordinated with the other trades.
    b. Provide the noded and dimensioned portion of the sprinkler system drawing independently of the reflected ceiling plan drawings (for clarity in submittal reviews).
    c. Provide ceiling elevations and pipe elevations.
    d. Identify and note the area of each zone.
    e. Identify and note the area of each remote area.
    f. Indicate make, type, and orifice size of sprinkler heads.
    g. Identify all locations where piping and/or fittings will be exposed to sight along with identification of all trapped segments of pipe and auxiliary/low-point drains.
    h. Identify all walls and/or floors which are fire-rated, smoke barriers, or smoke partitions that are penetrated by the fire protection piping or equipment. Identification of the wall/floor and penetration thereto shall include the required rating, type of construction, and reference to type of penetration seal that is to be used (including UL System Number). Refer to Architectural Drawings for locations.

i. Include a diagram of all control valves, checks, drain pipes, and test pipes.
j. Identify the location of all flushing connections and all removable spool pieces for future internal pipe inspections.
k. Identify source of water supply, pressure, and elevation.
l. Provide a table or tag for each remote area indicating the design and hydraulic calculation data.
m. Provide a copy of the hydraulic design information sign that will be installed on the riser.

F. Pressure Tests

1. Submit pressure testing documentation to Engineer upon completion of testing.
2. Refer to Sections 21 03 00 and 21 10 00 for additional information.
3. Final copies shall be included in the Operating and Maintenance Manuals.

G. Valve Schedules

H. Grooved Coupling Training

I. Painting samples and/or letters for painting coordination.

1.8 APPROVALS

A. Submit shop drawings and hydraulic calculations to, and obtain approval from government agencies having jurisdiction and owner's insurance underwriter. Concurrently, and prior to construction, submit shop drawings, product data, and hydraulic calculations to the Architect/Engineer and Owner for review.

B. All devices and materials pertaining to all Fire Protection work shall bear the UL stamp of approval and be FM approved.

1.9 CONSTRUCTION DOCUMENTATION

A. Pressure Tests

1. Submit pressure testing documentation to Engineer upon completion of testing.
2. Refer to Section 210300 for additional information.
3. Final copies shall be included in the Operating and Maintenance Manuals.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Prior to final acceptance, complete CAD record drawings and hydraulic calculations shall be submitted to the A/E for review.
2. Record Drawings shall reflect as-built conditions and show changes in:

a. Size, type, capacity, etc. of any material, device or piece of equipment
b. Location of any device or piece of equipment
c. Location of any outlet or source in building service system.
d. Routing of any piping, conduit, or other building services.

3. Record drawings shall reflect all piping and head location deviations for the approved shop drawings including all additional fittings.
4. Record Drawings shall indicate the location of all underground, under floor and concealed piping.
5. Record Drawings shall indicate rated walls where firestop materials have been applied.
6. Record Drawings shall indicate the location of all tagged valves including the tag designations.
7. Provide one half-sized, laminated set of approved record drawings. Install a complete set of these drawings near the incoming fire water service location/alarm check valve.

B. Operating and Maintenance Manual (OMM)

1. Once submittals are completed, provide an OMM index to the Engineer for review. Once index is approved, submit an electronic copy of the OMM to the Engineer for acceptance.

2. Furnish electronic Portable Document Format (PDF) of Operating and Maintenance Manuals. Refer to Division 1 Specifications for additional requirements.
3. Each OMM shall be assembled into one electronic file or multiple files broken up by section if the file size is larger than 15Mb.
4. Combine all electronic files and arrange as follows, unless otherwise directed in Division 1 Specifications. Include a title tab for each section and an index at the beginning of each individual section. If a section listed below does not apply to the Project, renumber sections accordingly. Multiple files broken up by section are allowed if file size in greater than 15Mb.

   a. First Page --- Title of Project, Owner, Address, Date of Submittal, Name of Contractor and Name of Engineer, including contact information, phone numbers and email addresses.
   b. Second Page --- Index. Index shall include hyperlinks to each section listed.
   c. First Section --- Written description of system contents including where actually located in building, how each part functions individually, and how system works as a whole. Included step by step procedures for startup and shut down for each system and piece of equipment. Conclude with a list of items requiring service and either state the service needed or refer to the Manufacturer's data in the file that describes the proper service.
   d. Second Section --- A consolidated copy of updated information and product data from each approved Submittal including but not limited to:

      1) Waterflow Switches
      2) Supervisory Switches
      3) Sprinkler Heads
      4) Flexible Sprinkler Hose and Fittings
      5) Test/Drain Assemblies
      6) Control Valves

   e. Third Section --- A copy of each equipment Manufacturer's operating and maintenance instructions and where applicable, a copy of the equipment startup report. Maintenance instructions shall include name of service agency, spare and replacements parts lists, and lubrication instructions.

f. Fourth Section --- A copy of all test results performed by the Contractor. Test results shall include flushing and pressure tests. Provide Contractor's Material and Test Certificates as required by NFPA 13.
g. Fifth Section --- A copy of all valve schedules and directories.
h. Sixth Section --- A copy of all guarantees and warranties.
i. Seventh Section --- Owner training sign-in sheets including all data utilized in the training sessions and a list of all digitally recorded training sessions.

1) Include electronic format of all recorded training sessions on portable memory device (Optical media or USB stick).

j. Eighth Section --- CAD files of Record Drawings and pdf of Record Hydraulic Calculations (updated to reflect actual field installation). Provide all flow test data including date, location, time, and pressure readings.
k. Ninth Section --- A list of attic stock furnished for the project.
l. Tenth Section --- Final Punch List with Contractor's responses.

5. The electronic OMM shall be delivered to the Owner and Engineer on portable memory device or optical media - Owner shall be provided with up to 5 copies on separate portable memory device or optical media and the Engineer shall be provided with a single copy.

a. OMM index page shall have cross-reference links to each section.
b. Sections containing more than 30 pages shall have a section index with cross-reference links.
c. PDF text shall be recognizable and shall be searchable by use of a "Ctrl-F" or "find text" function.

C. Operating Instructions

1. A synopsis of the requirements of NFPA 25.
2. Recommended periodic testing procedure.
3. Recommended preventive and scheduled maintenance procedures.
4. Completed Final Certificates for All System Tests.
5. Mechanical sequence of operation.
6. Any necessary diagrams.
7. Recommended spare parts list for one (1) year maintenance program.

D. Certifications

1. Hydrostatic pressure test certificate - Contractor's Material and Test Certificate for Aboveground Piping.

1.11 OWNER TRAINING

A. Before final payment, demonstrate to the Owner's satisfaction the proper operation of each of the systems provided as part of the Contract Documents.

B. Provide to Owner after all equipment, systems and controls are in operation and at an agreeable time, instructions for the purpose of training Owner's maintenance personnel in the operation and maintenance of all Fire Protection equipment, systems and controls.

C. Provide a "sign-in" sheet at each training session. A copy of each "sign-in" sheet shall be included in the Operating and Maintenance Manual.

D. Refer to individual Division 21 sections for minimum time periods for training.

E. Deliver to the Owner all special tools and appurtenances for proper operation and maintenance of the equipment provided and request receipt for same. Attach to the Contractor's request for final payment.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Consult the Contract Documents and Submittals pertaining to the work for other trades. Review the field layouts for all trades and make adjustments accordingly in laying out the Fire Protection work.

B. Examine the work of all other trades when it comes in contact with, or is covered by, work in this Division. Do not attach to, cover up, or finish against any defective work, or install work in a manner which will prevent proper installation of the work of other trades. Fire Protection Contractor shall be responsible for the costs of adjustments required.

3.2 PRODUCT HANDLING

A. Pay all costs for transportation of materials, equipment to job site.

B. Provide all scaffolding, tackle, hoists, rigging necessary for placing Fire Protection materials and equipment in their proper place. Scaffolding, hoisting equipment: comply with applicable Federal, State, and Local regulations. Remove temporary work when no longer required.

C. Arrange for packaging of equipment, which must be hoisted, so that there will be no damage or distortion caused by hoisting operation. Protect all piping, ductwork, and equipment from any damage during hoisting operation.

D. Store equipment, controllers, etc., in dry location and protect from dirt and moisture until building is ready to receive them.

E. Coordinate location of stored items with other trades. Where necessary, store materials and equipment on movable carts so they may be moved when interfering with the work of other trades.

3.3 DAMAGE AND EMERGENCY REPAIRS

A. Assume responsibility for any damage to new or existing building components caused by work provided as part of the Contract Documents, including leaks in piping systems being installed or reworked. Repair all damage without extra cost to Owner.

B. Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during warranty period.

C. Restore roads, grounds, paving, insulation, piping, building components, etc., to their original condition whenever this work causes damage.

3.4 CLEANING

A. At all times keep premises and building in neat and orderly condition, follow explicitly any instructions in regard to storing of materials, protective measures and disposing of debris.

B. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Thoroughly clean all piping, and equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

C. All debris created by the execution of this work shall be removed as directed by the Architect or Owner.

D. Upon completion of work remove all tools, equipment and surplus materials.

3.5 PAINTING

A. Finish painting is included under Division 9 - Finishes, except where specifically called for in Section 210300.

B. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.

C. No equipment or piping shall be painted before being tested.

D. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match existing finish.

E. The Contractor shall submit a letter of coordination verifying those aspects of painting preparation being done under this Contract. The Painting Contractor shall concur upon this coordination letter prior to submission. The Contractor shall submit color samples and manufacturer's instructions for those aspects of painting being provided by the Contractor.

3.6 INDOOR AIR QUALITY

A. Provide temporary ventilation and/or filtration systems of sufficient size and quantity to ensure complete removal of all odors, fumes, and airborne contaminants generated. Maintain 25 feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

B. If the building HVAC system is used and adjustments are made for ventilation purposes, rebalance systems to maintain occupied areas pressurization and air change requirements.

C. Arrange with Owner to override the HVAC system control of night setback functions to assist with ventilation of building.

D. Comply with SMACNA guideline "IAQ Guidelines for Occupied Buildings Under Construction" Second Edition - 2007.

END OF SECTION

SECTION 210200 - FIRE PROTECTION DEMOLITION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Fire Protection equipment, piping, and systems indicated on the Demolition Drawings are shown to indicate the extent of demolition only and not intended to be a record drawing of the existing conditions. The Drawings and Specifications establish the minimum standards for workmanship and materials.

1. If additional interpretation is required regarding the scope of demolition, contact the Engineer prior to bid.

B. Include all labor, materials, equipment, services, and permits necessary for completion of the demolition work.

C. Provide protection for all adjacent areas before, during and after execution of the demolition work.

D. Comply with all the rules and regulations of local and state Authorities Having Jurisdiction, including applicable OSHA safety requirements.

E. Visit the site and become familiar with conditions affecting the demolition work. No additional compensation shall be approved on claims that arise from a lack of knowledge of the existing conditions.

F. Normal building functions shall be maintained during the demolition work. Coordinate the day and time of any temporary building system interruptions with the Owner. Additional compensation shall not be approved for premium time effort.

G. Maintain existing sprinkler protection as long as possible. Provide temporary protection only as directed by Division 1 Specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment for completion of the demolition work as described within the Specifications and on the Drawings.

B. Materials and equipment shall be new and UL labeled for the application.

PART 3 - EXECUTION

3.1 GENERAL DEMOLITION WORK

A. Disconnect and remove existing Fire Protection Work made necessary because of Project alterations as indicated or implied on the Contract Documents of all trades. Relocate equipment and/or devices where indicated. Existing Fire Protection equipment, piping and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not.

B. Fire Protection equipment, piping and systems shall be de-energized prior to disconnection and removal.

C. Demolition Work under this Contract shall be accomplished by the Contractor in complete accordance with the Construction Procedure and Progress Schedule specified under Division 1. Proposal shall include any special phasing requirements related to demolition work as described in the Division 1 Specifications.

D. Remove existing equipment indicated including piping connections. Existing equipment shown as being reused or relocated shall be carefully removed, stored on the premises, and refurbished before reinstallation. Provide new sprinkler heads when the existing heads are removed. Do not re-use existing sprinkler heads.

E. Equipment to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for delivery to the Owner. All other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

F. Where required, re-support existing to remain piping above ceilings being removed.

G. Remove piping as described on the Drawings. Cap or plug as indicated or as required by Code. Identify in the field where piping connections are to be reused.

H. Provide drainage, capping, and re-filling as necessary to isolate portions of systems to enable full or partial demolition.

I. Maintain valves with supervisory switches wired to the existing fire alarm system for as long as possible. When not possible, provide temporary chains and locks as necessary for active systems.

J. In case of existing valves failures, replace valves in kind or as specified for new service to enable positive shut-off and keep with project schedule as much as possible. Report any such cases immediately upon discovery to the Architect or Engineer.

K. For portions of existing piping systems to be re-used, visually inspect for signs of leaks. Report any such cases immediately upon discovery to the Architect or Engineer. Provide testing similar to that as required for new piping systems to ensure adequate condition.

L. Cutting, patching, finishing, etc., for removed and relocated Fire Protection equipment, piping and systems shall be included as part of the Fire Protection Work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing construction. Patching shall be performed by the qualified trade.

M. Where equipment, piping and systems are removed from fire or smoke rated construction, penetrations shall be patched to match existing ratings with suitable materials matching existing construction. Patching shall be performed by the qualified trade.

N. Remove and reinstall existing ceiling tiles in areas outside the scope of demolition work as required to complete the demolition work outlined within these Specifications or indicated on the Demolition Drawings. Damaged tiles shall be replaced to match existing.

END OF SECTION

SECTION 210300 - FIRE PROTECTION BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Pipe and Fittings

B. Valves

C. Flow switches

D. Supervisory switches

E. Pressure Gauges

F. Escutcheons

G. Sleeves

H. Inserts, Hangers and Supports

I. Electrical Connections

J. System and Equipment Identification, Nameplates, Markers and Tags

K. General Installation Requirements

L. Access to Equipment and Devices

M. General Piping

N. Startups

O. Tests and Adjustments

1.2 SUBMITTALS

A. Refer to Sections 21 01 00 and 21 01 01 for submittal requirements and to individual sections for detailed requirements.

1.3 CONSTRUCTION DOCUMENTATION

A. Refer to Section 210100.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Above Ground

1. Pipe and tube for wet pipe systems shall be black, welded or seamless steel as scheduled in NFPA 13. Piping joined with threaded fittings shall have a minimum of schedule 40 wall thickness. Roll grooved piping or welded piping shall have a minimum of schedule 10 wall thickness. Cut grooves shall not be permitted. All pipe shall be provided with a factory antimicrobial coating to assist in limiting corrosion from MIC or other microbes.

    a. Threaded Fittings shall be cast or malleable iron type in accordance with NFPA 13.
    b. Utilize black fittings on black pipe applications and galvanized on galvanized pipe.
    c. Unions in steel piping 2 inches and smaller, malleable iron, ground joint brass to iron seat suitable for 175 PSI working pressures. For larger pipe sizes, used flanged or grooved joint systems.

2. Groove joining shall be done by an approved combination of domestically produced fittings, couplings, pre-lubricated gaskets and grooves. Grooves on pipe shall be dimensionally compatible with fittings. Acceptable suppliers are Victaulic Company of America, or approved equivalent by Grinnell Mechanical Products, or Anvil International-Gruvlok.

    a. The grooved coupling Manufacturer's Representative shall provide an on-site training session with the Contractor's sprinkler fitters to ensure that the products are being properly installed and utilized. The Contractor shall provide documentation of such training to the Professional.
    b. Couplings shall consist of two ductile iron housing segments to ASTM A536, pressure responsive elastomer gasket to ASTM D2000, and zinc-electroplated steel bolts and nuts to ASTM A449 or ASTM A-183.
    c. Grooved fittings. All mechanical fittings and couplings shall be manufactured by the same company and be suitable for use on fire system.
    d. Flange Adapter: Flanged connection transitions shall be made via approved adapters.
    e. Gaskets shall be compatible with the manufacturer's coupling and be approved for fire protection service for the application.

3. Other galvanized pipe applications include:

    a. All miscellaneous drain and test piping and fittings shall be Schedule 40 internally and externally galvanized.

2.2 VALVES

A. Valves for Fire Protection systems shall be UL Listed and FM Approved for Fire Protection Service.

B. Typical Manufacturers include but not limited to: Kennedy, Mueller, Nibco, and Victaulic.

C. All Fire Protection Service valves shall be capable of being monitored with tamper switches.

D. All valves in each system, except for special types, shall be the product of a single manufacturer.

E. Valves shall have the name or trademark of the manufacturer and the working pressure stamped or cast on the valve body. Valves shall have listing or approval agency identification mark stamped or cast on valve body.

F. Valves shall have a working pressure rating consistent with the maximum operating pressure of the system (nominally rated at 175 or 250 psi).

G. Auxiliary valves (e.g. drain valves) need not be listed for Fire Protection Service.

H. Butterfly Valves

1. Fire Protection Butterfly Valves shall be in accordance with UL 1091.
2. Valves shall be equipped with an integral indicating device and wiring pigtail.

I. Check Valves

1. Fire Protection Check Valves shall be in accordance with UL 312.

2.3 FLOW SWITCHES

A. Vane type waterflow switch/detectors shall be installed on the sprinkler system piping as designated on the drawings. Typical vendors and models include: Potter Electric Signal Co. Model VSR or System Sensor Model WFDN. Size as required for piping served.

B. Switch shall be UL listed and FM approved

C. Said switch/detectors shall be designed for mounting on either vertical or horizontal piping, but shall not be mounted in a fitting or within 6 inches of any fitting that changes the direction of water flow or 24 inches of a valve or drain.

D. Said switch/detector shall have a flow sensitivity setting to signal any flow of water from 4 to 10 GPM.

E. The waterflow switches shall have a minimum rated capacity of 10 amps at 125V AC and 2 amp at 0-24V DC resistive, two (2) normally open contacts, and shall be actuated by a polyethylene vane extending into the waterway of the piping.

F. The waterflow switch/detectors shall be of weatherproof, dust tight construction, shall provide a ½ inch conduit entrance, and shall be finished red.

G. The waterflow switch mechanisms shall incorporate an instantly recycling retard element in the adjustable range of 0 to 70 seconds.

H. Install flow switches according to manufacturer's recommendations.

I. Flow switches to be wired under Division 26.

2.4 SUPERVISORY SWITCHES

A. Supervisory switches shall be installed on the system control valves. Typical vendors include: Potter Electric Signal Co. and System Sensor. Provide with 2 sets of SPDT contacts. Switch shall be UL listed and FM Global approved.

B. The mechanism shall be contained in a weatherproof, die cast aluminum housing, which shall provide a ¾ inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valve.

C. Tamper switches shall be of the appropriate style for the valve being monitored and installed per manufacturer's recommendations.

D. Division 26 to wire.

2.5 PRESSURE GAUGES

A. Provide gauges having proper ranges as required by conditions. Gauges to have 4-1/2 inch diameter dials, cocks, and snubbers.

B. Provide gauges at all locations as required by NFPA.

C. Select scale ranges so pressure condition will fall approximately at mid-scale. Manufacturer: Ashcroft, Marsh, Trerice, or equivalent.

2.6 ESCUTCHEON PLATES

A. Fit all pipe passing exposed through walls, floors, or ceilings in finished rooms with steel or brass escutcheons.

B. Where surface is to receive a painted finish make escutcheons prime painted; otherwise make escutcheons nickel or chrome plated. Where piping is insulated, fit escutcheons outside insulation.

2.7 SLEEVES

A. Where pipes pass through masonry or concrete walls, set machine cut steel pipe sleeves 1 inch larger than outside diameter of pipe, with ends of sleeves flush with wall faces. Sleeves in partitions other than masonry or concrete where firestopping is required: 28 gauge galvanized steel sheet or as specified by the firestopping manufacturer's literature.

B. Where pipes pass through floors, set Schedule 40 galvanized steel pipe sleeves 1 inch larger than the outside diameter of the pipe. Top of sleeve to be 4 inches above finished floor in machine rooms and wet floor locations. Seal along the outer edge of the sleeve.

C. Set sleeves true to line, grade; position and plumb or level and so maintain throughout construction period.

D. Where concrete or masonry walls are core drilled for pipe passage steel sleeves are not required.

E. Provide fire stopping between pipe and sleeve or opening as required to maintain the integrity of the fire rating of all walls and floors.

2.8 INSERTS, HANGERS, AND SUPPORTS

A. All piping shall be supported per NFPA 13 requirements. The portion of the hanger that directly attaches to the piping or the building structure shall be listed for that purpose.

B. Hanger spacing, support of vertical pipes/risers, and trapeze hangers shall be as required by NFPA. There shall not be less than one hanger for each section of pipe.

C. Provide all inserts, hangers, anchors, guides and supports to properly support and retain piping, conduits and equipment; to control expansion, contraction, anchorage, drainage and prevent sway and vibration.

D. Provide supplementary angles, channels, and plates where supports are required between building structural members, span the space and attach to building structural members by welding, bolting or anchors.

E. Provide hangers, threaded rods, turnbuckles, anchors, and all other miscellaneous specialties for the attachment of hangers and supports to structure.

F. Provide rods, angles, rails, struts, brace plates, and platforms required for suspension or support of piping, conduit and equipment.

G. Support individual piping from hangers as manufactured by Anvil, Erico or Caddy.

H. Provide additional lock nut on each threaded support rod.

I. Provide additional hanger support within two feet of each elbow and at valves, and other equipment in pipe lines.

J. Do not suspend a pipe from another pipe or ductwork. Fire Protection System piping shall not be supported from the bottom chord of bar joists. Do not support any item from metal roof deck. Do not support ceiling framing or lighting from piping.

K. Where fireproofing is removed or damaged to allow attachment to building structural members, repair to maintain integrity of fireproofing.

L. Do not bend or angle threaded rod. Hangers used on sloped or angled structures shall be of the articulating beam clamp style or follow the NFPA 13 allowance for reducing lateral loads.

M. The use of powder driven anchors for hanging of fire protection equipment is generally prohibited. The use of powder driven anchors may be permitted for certain applications where no other reasonable alternative exists. Specific approval by the Professional or CM is required prior to use.

2.9 ELECTRICAL CONNECTIONS

A. Refer to those portions of the Contract Documents which establish electrical characteristics and furnish equipment to operate on that service.

B. Starters shall be provided under Division 26 Work, unless otherwise noted. Starters to be provided with proper NEMA enclosures, surface or flush application as required. Where equipment has magnetic starters furnished as an integral part of the equipment, disconnect switches shall be provided under Division 26 Work.

C. Provide coordinated wiring diagrams for motor equipment of Fire Protection system conforming to system operation specified. Provide line diagrams, power diagrams, terminal connections. Submit all such drawings as shop drawings.

2.10 SYSTEM AND EQUIPMENT IDENTIFICATION

A. Equipment Nameplates

1. Equipment nameplates shall be laminated phenolic with a black surface and white core. Use 1/16 inch thick material for plates up to 2 inch by 4 inch. For larger sizes use 1/8 inch thick material.
2. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use 1/4 inch minimum height letters which occupy four to the inch.
3. Nameplates shall be attached to equipment with brass screws or rivets; no adhesive attachments will be permitted.
4. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

B. Valve Tags

1. Tags shall be 2" diameter, 1/16" thick, multilayered acrylic with engraved letters.
2. Lettering shall be 3/4" high for type service and ½" for number. Tag shall indicate service and valve number. Letter and number designations shall be coordinated with the Owner.
3. Each service shall be a different color in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI A13.1).
4. Tag shall be attached with chain similar to Seton No. 16 stainless steel jack chain. Use of beaded chain or wire is not acceptable.
5. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

C. Pipe Markers

1. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI A13.1).
2. Flow direction arrows shall be included on each marker.
3. Snap-around markers shall be used for overall diameters up to 6" and strap-around markers shall be used above 6" overall diameters.
4. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

D. Ceiling Markers

1. 3/4" square plastic marker with white background and black engraved letters and numbers identifying equipment, valve, etc. concealed above ceiling.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Location of piping, equipment, and any sprinkler heads on the drawings are diagrammatic; indicated positions shall be followed as closely as possible, exact locations shall be subject to building construction and interferences with other work. In general, conceal piping located outside of equipment rooms and where ceilings exist. Difficulties preventing the installation of any part of work as indicated, shall be called to the attention of the Architect. Architect will determine locations and changes. Contractor shall install the work accordingly. Architect reserves right to make minor changes in location of any part of the work up to the time of roughing-in without additional cost.

B. Attempts have been made to identify existing equipment locations and piping routing and sizes with use of existing drawings and field observations. Contractor shall field verify all existing information, report any discrepancies to the Architect or Engineer and note on the Record Drawings.

C. At locations in project involving alterations, assume responsibility for removal, rerouting, protection and replacement of existing facilities as necessary to install new work. Work to be executed by craft which customarily or by jurisdictional award performs such service. Refer to 21 02 00 for additional information.

D. Coordinate all work with the phasing of the Project. Adjacent building areas must remain active to serve occupied areas during construction. Coordinate all phasing requirements with the Owner.

E. Install all materials and equipment in a neat and workmanlike manner by competent specialist for each subtrade. The installation of any materials and equipment not meeting these standards may require removal and reinstallation at no additional cost to the Owner.

F. Locate piping and other services, in pipe spaces, to ensure maximum accessibility. Where necessary to cross pipe spaces, crossing must be made near the floor or 6 feet or more above floor.

G. Install, connect equipment, services, and materials according to best engineering practice and in conformity with manufacturer's printed instructions. Provide complete auxiliary piping, water seals, valves, electric connections, controls, etc., as recommended by respective equipment manufacturer or required for proper operation.

H. Take all measurements and determine all elevations at the building.

3.2 ACCESS TO EQUIPMENT AND DEVICES

A. All valves, tampers switches, flow switches, equipment, and other devices requiring examination, adjustment, service, and maintenance shall be accessible. If located above drywall ceiling or behind finished walls, provide an access door. Coordinate all access door locations with the Architect and General Trades.

B. To ensure accessibility during and after construction, when a device is installed, its location shall be marked with securely attached temporary signage. Signage shall indicate the amount of clearance required for the specific device. Signage shall remain in place until the ceiling or access door is installed or until substantial completion.

C. Clearance shall include not only code required clearance but also clearance for Owner's staff to access the device. This access shall be from the floor or from the floor level using normal maintenance ladders and apparatus to meet all OSHA requirements. Consideration shall be given to accessing a device through an access door.

D. Where a device is installed above finished ceilings, signage shall be hung below the device at the finished ceiling level. Where a device is exposed, in open ceiling areas, signage shall be hung at approximately 8' above the floor level.

E. Fire Protection Contractor shall monitor these access locations until substantial completion and notify Architect, Owner and Engineer when the access area is encroached upon so that corrective action may be taken immediately.

F. Corrective action shall be the responsibility of the trade encroaching the access area.

3.3 GENERAL PIPING

A. Drawings (floor plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, water supply, and other design considerations. So far as practical, install piping as indicated.

B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

C. Install ball and butterfly valves with the stems at the horizontal position and the handle pointing in the direction of flow.

D. Install all valves and equipment with unions or flanges or grooved couplings to facilitate removal.

E. Plug open ends of pipe or equipment at all times during installation to keep dirt and foreign material out of system.

F. Arrange and install all pipes, valves, access openings and equipment so as to be accessible for service. Locate equipment to maintain clearances for periodic servicing.

G. Install Grooved Piping System according to manufacturer's recommendations, including any torque requirements.

H. Support piping so as not to place a strain on valves or equipment.

3.4 STARTUPS

A. Coordinate schedule for start-up of various equipment and systems. Notify Owner days prior to start-up of each item.

B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

C. Verify wiring and support components for equipment are complete and tested.

D. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.

E. Verify that specified tests of piping are complete.

F. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

G. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.

H. Fill wet-pipe sprinkler piping with water.

I. Energize circuits to electrical equipment and devices.

J. Adjust operating controls and pressure settings.

K. Coordinate with fire alarm tests. Operate as required.

L. Execute start-up by service technicians employed or authorized by the manufacturer to provide startup service according to manufacturer's instructions.

M. Provide written reports that equipment and systems have been properly installed and are functioning correctly. Where start-up is by a factory authorized representative, report shall be on manufacturer's forms intended for the purpose. Reports shall be included in the Operating and Maintenance Manual.

N. Equipment and systems not installed properly or operating correctly shall be corrected or replaced and its proper operation shall again be verified. This Contractor shall be responsible for the costs of any and all re-inspections.

3.5 TESTS AND ADJUSTMENTS

A. The contractor shall notify the Professional and the AHJ 3 weeks or more in advance of all tests to be conducted.

B. Report test results promptly and in writing to the Professional and AHJ.

C. Obtain all inspections required by law, ordinances, rules, regulations of authorities having jurisdiction, furnish certificates of such inspections. Pay all fees, and provide all equipment, power and labor necessary for inspections and tests.

D. During testing period maintain on the project an engineer or approved manufacturer representative thoroughly familiar with all phases for as long a period as required to thoroughly adjust all systems and demonstrate that they are functioning properly.

E. Perform all tests, including but not limited to those specified, make necessary adjustments to obtain specified equipment and system characteristics.

F. Do not consider work under this Specification complete until required inspections have been obtained, tests performed, necessary adjustments made and satisfactory evidence of compliance has been submitted. Architect reserves right to make spot checks to determine accuracy and completeness of final adjustments.

G. Piping Pressure Tests:

1. All piping shall be given a pressure test as required by Specification Section 211000. Equipment which would be damaged by the required test pressure shall be isolated from the system during test.
2. Correct minor leaks in welded joints by chipping out weld and rewelding. Correct leaks in screwed joints by replacing thread or fitting or both. Caulking of threaded joints is not permitted.
3. Perform all tests before piping is concealed or covered.
4. Be responsible for completely draining the systems after hydrostatic tests are performed. Any damage from freezing prior to acceptance of the completed installation shall be repaired at no additional cost to the Owner.
5. All tests shall be scheduled and documented. Include copy of the piping system pressure test reports in the Operating and Maintenance Manual.

H. The entire system shall be tested in accordance with the requirements of NFPA 13 and all local requirements. Contractor's Material and Test Certificates shall be completed, signed, and dated and included in the Operations and Maintenance Manuals

I. Any retesting that is required due to failure of any test for any reason shall be conducted at no additional cost to the owner. Any corrections or repairs to the system or building necessary due to such a failure, and retesting of the system shall be performed at no cost to the owner.

3.6 SYSTEM AND EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment as to nature of service and system number corresponding to designation in Contract Documents, by stenciling with 1 inch high letters or attaching two color engraved nameplates. Equipment designations shall conform to the Owner's Standard.

Items	Type Identification
Sprinkler and Standpipe Risers	Refer to Section 211000

B. Valve Identification

1. Identify all system and drain valves with tags attached with chain. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve directory. All letter and number designations shall be coordinated with the Owner.
2. Designations and locations shall be accurately recorded on the Record Drawings.

3. At completion of project, provide a framed valve schedule or directory, under Plexiglass, giving number of valve, service, building location by column coordinates, floor location, manufacturer's figure number, size, and equipment controlled. For service, use designation shown in legend on drawings. Mount where directed by Owner.
4. At completion of the project, edit existing valve directory as required.

C. Valve Schedule.

1. Provide a valve schedule for all valves as indicated above.
2. Every valve shall include.

   a. Tag Number
   b. Service (Sprinkler, etc.)
   c. Size
   d. Operation
   e. Location
   f. Manufacturer
   g. Model Number
   h. Submittal Reference

D. Pipe Markers

1. Identify each new and existing pipe in Equipment Rooms, above accessible ceilings and in accessible shafts.
2. Markers shall be located:

   a. Adjacent to each valve.
   b. At each branch.
   c. At each cap for future.
   d. At each riser takeoff.
   e. At each pipe passage through wall (each side).
   f. At each pipe passage 20' - 0" intervals maximum.
   g. At each piece of equipment.
   h. At all access doors.
   i. A minimum of one (1) marker shall be provided at each room.

E. Where installed above lay-in ceilings provide ceiling markers to locate equipment, valves, traps, dampers, etc. that require regular maintenance or are part of a Life Safety System

END OF SECTION

SECTION 210400 - FIRE PROTECTION FIRESTOPPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work of this Section includes, but is not limited to, furnishing and installing firestopping for fire-rated construction in the following areas:

1. All openings in fire-rated floor, wall, ceiling and roof assemblies, both empty and those accommodating penetrating items.
2. Openings at each floor level in shafts or stairwells.
3. Empty openings intentionally designed as spare openings in fire rated Construction.

B. Penetrating items shall include the following:

1. Cables.
2. Conduit.
3. Pipes without insulation.
4. Pipes with insulation. All insulation must remain intact, undamaged and shall run continuously through walls and floors.

1.2 QUALITY ASSURANCE

A. General

1. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings required by local building code and as tested by nationally accepted test agencies per fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance of the assembly being penetrated.
2. Manufacturer¢¢s engineering judgments will be accepted for non-standard applications or where no tested system exists. Drawings for engineering judgments must indicate the UL tested system or systems upon which the judgment is based, in order to evaluate the engineering judgment against a known performance. Engineering judgments shall be approved by the Architect.
3. Firestopping materials and systems shall be capable of closing or filling openings created by:

   a. The burning or melting of combustible materials.
   b. Deflection of materials due to thermal expansion.

4. Firestopping material shall be non-halogenated, lead and asbestos free and shall not incorporate nor require the use of hazardous solvents.
5. Firestop products which dissolve in water after curing are not acceptable.
6. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to a Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Manufacturer's Field Representative: The Manufacturer of the firestop material of this Section shall provide a qualified field representative at the site.

D. Pre-Installation Conference: Contractor shall hold a pre-installation conference with representatives of the Architect, Contractor, Installer, Materials Manufacturer and various trades involved in the Work, to review conditions affecting the installation and consistency of manufacturer to be used by all trades.

E. Conform to Manufacturer's printed instructions for installation in accordance with a U.L rated system or Manufacturer¢¢s engineering judgement.

F. Codes and Standards

1. ASTM E 84
2. ASTM E 119
3. ASTM E 814
4. UL 263
5. UL 1479

1.3 SUBMITTALS

A. Refer to Sections 21 01 00 and 21 01 01 for additional requirements.

B. All submittals shall conform completely to the requirements of the Contract Documents.

C. Product Data: For each type of material to be installed, literature shall indicate product characteristics, typical uses, performance, test data and Manufacturer's installation procedures.

D. Shop Drawings: Include U.L. rated system number and details for each type of penetration or configuration.

1. Show typical installation details including:

a. Minimum and maximum allowable annular spacing.
b. Base material composition.
c. Firestop materials selected.
d. Applied thickness required to achieve the hourly rating.

E. Where required, submit Product Data and Shop Drawings to the Authority Having Jurisdiction (AHJ) for review and approval. Information shall include the Manufacturer's assembly detail with UL system number, technical data and installation instructions for each penetration type occurring on the project.

F. Close-out Documents

1. Final approved product data and shop drawings of all materials installed shall be included in operating and maintenance manuals.
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer¢¢s labels identifying product and manufacturer, UL label, date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes. Materials shall be stored off the ground and protected from environmental conditions as required by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.5 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, provide for curing in accordance with manufacturer suggested temperature requirements.

B. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

C. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

D. Do not use materials that contain flammable solvents.

E. Do not install water based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.

1.6 PROTECTION

A. Where firestopping is installed at locations which shall remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.7 SEQUENCING

A. Coordinate this work as required with work of other trades.

B. Firestopping shall precede finishing of gypsum board.Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal deck placement or composite deck installation but before placement of concrete.

1.8 WARRANTY

A. Contractor shall provide written certification that all firestopping was installed in accordance with the Manufacturer's written instructions for UL tested assemblies and that all firestop systems installed meet firestopping requirements as herein specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials shall meet the requirements specified herein.

B. For applications where combustible penetrants are involved, i.e. insulated or plastic pipe, a suitable intumescent material must be used.

2.2 ACCEPTABLE MANUFACTURERS

A. Specified Technologies, Inc. (STI)

B. 3M

C. Hilti, Inc.

2.3 FIRESTOP MATERIALS

A. Firestop Mortar

B. Intumescent Firestop Sealants and Caulks

C. Elastomeric Firestop Sealants and Caulks

D. Endothermic Firestop Sealants and Caulks

E. Firestop Putty

F. Rough-in Box Inserts

G. Firestop Pillows/Blocks

H. Fire Rated Pathways

I. Firestop Grommets

J. Firestop Collars

K. Wrap Strips

L. Cast in Place Devices

M. Firestop Foams

N. Composite Sheets

O. Intumescent Gaskets

PART 3 - EXECUTION

3.1 GENERAL

A. In an occupied building, permanent firestopping shall be installed within 24 hours of penetrating a fire rated assembly. If permanent firestopping cannot be installed within this time period, temporary firestop pillows/blocks are permitted, where installation allows, until permanent firestop materials can be properly installed.

3.2 INSPECTION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until the Contractor, in a manner acceptable to the Architect has corrected unsatisfactory conditions.

B. Verify that environmental conditions are safe and suitable for the installation of the firestop products.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified elsewhere whether or not firestopping is indicated and, if indicated whether such material is designed as insulation, safing, or otherwise.
2. All firestopping shall be installed in accordance to the UL rated system designed for the application.
3. Grout, Mortar or Gypsum based products shall not be installed in lieu of firestopping material specified herein.
4. All smoke walls (smoke barriers, smoke partitions, etc.), rated or non-rated, shall be firestopped with systems designed to maintain a minimum 1 hour rating or that which is equal to the rating of the wall.

B. Penetrations - Provide firestopping as follows:

1. Where penetrations pass through one or both surfaces of a fire rated floor or wall.
2. Where a penetration occurs through fire rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition.
3. Except for slab on grade, where penetrations pass through a non-fire rated floor.
4. The requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening. Upon installation of cabling through sleeve, firestop the remaining open area within the conduit.

C. Where demolition has occurred in rated walls, floors and assemblies, the material used to patch the opening shall match the material used for the assembly construction. Firestopping materials may be utilized upon approval of Architect and Engineer. Materials used shall be provided with submittals. Work performed shall be the responsibility of the Contractor whose work was removed, performed by the appropriate trade.

3.4 PREPARATION

A. Surface to receive firestop shall be free of dirt, dust, grease, oil, oil from release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items.

B. Substrate shall be frost free.

3.5 INSTALLATIONS

A. General

1. Sleeves and core-drilled holes shall be sized at least 1-1/2" larger in diameter than penetrating items.
2. Installation of firestops shall be performed by applicators/installers qualified and trained by the Manufacturer. Installation shall be performed in strict accordance with the Manufacturer's detailed installation procedures.
3. Apply firestops in strict accordance with UL rated system designs, and Manufacturer's recommendations.
4. Coordinate with all other trades to assure that all items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other Construction which would conceal penetrations are not erected prior to the installation of firestop.
5. Gun grade sealants and putties shall be tooled into place to insure proper adhesion to penetrations and surrounding surfaces.
6. Where existing penetrations are reused that contain remnants of existing firestop products remain, remove all existing firestopping.

B. Dam Construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating.
2. Placement of dams shall not interfere with functions or adversely affect the appearance of adjacent construction.

C. Field Quality Control

1. Install work in full accordance with rules, regulations, and safety requirements of Federal, State, County and City authorities having jurisdiction over premises. Do not construe this as relieving Contractor from compliance with any requirements of the Specifications which are in excess of Code requirements and not in conflict therewith.
2. Correct unacceptable firestopping and provide additional inspection to verify compliance with this Specification at no additional cost.
3. Finish surfaces of firestopping that is to remain exposed in the completed work to a uniform and level condition.

3.6 LABELING

A. Where firestopping installations occur, Contractor shall provide a label adjacent to each penetration. Label shall include:

1. UL rated system used.
2. Date of installation.
3. Name of installing Contractor

B. Labels shall be furnished by the firestop manufacturer.

END OF SECTION

SECTION 211000 - WATER BASED FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Sprinkler fittings and appurtenances

B. Valves

C. Sprinkler

D. Accessories

1.2 SUBMITTALS

A. Refer to Section 210100 and 21 01 01.

1.3 DESIGN REQUIREMENTS

A. Design system and prepare the fire protection drawings and hydraulic calculations under direct supervision of a state certified sprinkler designer.

B. The Drawings indicate the general routing of sprinkler and fire mains. Lay out the sprinkler piping system indicating head locations and exact pipe routing. Sprinkler heads in lay-in ceilings shall be centered in the ceiling tile where they can be. Alternate acceptable locations for sprinkler heads in lay-in ceilings shall be the quarter points of the tile when the center cannot be achieved due to obstructions or to meet spacing requirements. For coordination and aesthetic purposes, suggested sprinkler head layouts may be shown for selected areas. All head locations shall be approved prior to installation.

C. Attention is called to the limited space available for the installation of fire protection services, it is essential for the coordination of all trades that this Contractor be responsible for confirming the location and elevations of piping and equipment at the job site to avoid encroaching upon the space needed and allocated for another trade.

D. Drawings are not intended to be scaled for rough - in measurement or to serve as shop drawings, installation drawings, or sleeve drawings. "Working Plans" for these purposes shall be prepared by the Contractor.

E. All piping shall be concealed in areas with finished ceilings or chases unless otherwise indicated. Sidewall sprinkler heads in-lieu-of running exposed piping shall be utilized where possible. Where piping cannot be run concealed (e.g., areas without ceilings), the exposed piping shall be routed as inconspicuously as possible in a neat and orderly fashion.

F. Flexible Sprinkler Hose and Fittings are permitted to be used. Flexible Sprinkler Hose and Fittings may be used throughout where ceilings are provided. This should not be construed as a prohibition against hard piped fittings to sprinkler heads, but rather as an allowance to utilize this technology. The contractor shall utilize conventional hard pipe methods where the need is warranted and/or the flexible products are not suitable.

G. The Contractor is responsible for the routing of sprinkler piping such that only piping serving the Electrical Rooms, Wiring Closets, and Telecommunication or data rooms shall be permitted to enter these rooms. Route piping so that it enters the room over the door. Routing of any piping above electrical equipment or panels shall be avoided throughout the building.

H. All sprinkler heads in areas throughout the building that are below 7 foot clearance or subject to mechanical damage shall be equipped with head guards.

I. Sprinklers shall be installed under all ducts or obstructions, greater than 48 inches in width, including overhead retractable doors, in accordance with NFPA 13.

J. Sprinklers near heat sources shall be provided in accordance with NFPA 13, with respect to temperature rating and location.

K. Provide readily removable fittings for flushing connections as per NFPA 13 on the ends of all cross mains. Branch lines on gridded systems shall be arranged to be readily disconnected to facilitate flushing. Identify locations on the shop drawings.

L. Provide a removable spool piece (minimum 1 foot in length between two mechanical fittings) in all risers, cross mains, and a representative number of branch lines throughout the system to allow NFPA 25, Chapter 14 internal pipe inspections to be easily completed in the future. Identify locations on the shop drawings.

M. All drains and inspectors test connections shall be piped to the exterior or suitably sized drain risers as indicated on the drawings. All piping and fittings on the discharge side of all drain valves shall be internally and externally galvanized.

N. Auxiliary and low-point drains shall be kept to a minimum. Auxiliary drains shall be provided in accordance with NFPA 13 except that all trapped sections shall be provided with an auxiliary drain consisting of a valve 3/4" or larger and a plug or nipple and cap. Auxiliary and low-point drains that are required to be piped to an accessible location are permitted to discharge to the building exterior, drain risers, mop receptors/sinks, or floor drains. All pipe segments that trap more than one head shall contain a low-point drain.

O. All control, drain, and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs. The sign shall be secured with corrosion-resistant wire, chain, or other approved means.

P. Where zone control valves are concealed above ceilings, identification signs shall be provided in the vicinity of the control valve to indicate location of said valve, the area isolated by said valve, and normal position of said valve.

Q. Provide an inspectors test connection. Test connections may be located off the system riser permitting that the initial system test can be conducted off the hydraulically most remote head. The most remote head should be an outlet with hose bib and cap.

R. All drains and inspectors test connections shall be piped to the exterior or suitably sized drain risers as indicated on the drawings.

S. Hydraulic Calculations

1. Automatic sprinkler piping systems shall be hydraulically designed by the Contractor in accordance with NFPA 13 requirements. Spacing, location and position of sprinklers and piping configuration shall be in strict conformance with these requirements.
2. Water supply

    a. The Contractor shall establish actual availability of water by obtaining the information from the local water department and performing a hydrant flow test.
    b. Degrade the results of the water flow test by 10% of the static pressure reading to account for fluctuations or degradation of the water supply.
    c. Preliminary design may be accomplished using the following information obtained from a flow test conducted on August 31st, 2021..

        1) Static/Residual Hydrant Location - Regent Ave NE
        2) 58 psig static pressure, 35 psig residual pressure with 960 gpm flowing.

    d. The effective point of the flow test is static/residual hydrant. The hydraulic calculations shall be conducted to the point of the effective flow test.

3. Hydraulic calculations shall be based upon the following occupancy classifications.

    a. Light Hazard: Offices, Conference Rooms, Corridors, and other areas of low combustible loading as defined by NFPA 13 shall have minimum design density of 0.10 gpm per square foot over the most hydraulically remote 1,500 ft^2.
    b. Ordinary Hazard, Group 1: Mechanical Spaces, Janitor's Closets, and other areas of moderate combustible loading as defined by NFPA 13 shall have minimum design density of 0.15 gpm per square foot over the most hydraulically remote 1,500 ft^2. Maximum sprinkler protection area will be limited to 130 ft^2.
    c. Ordinary Hazard, Group 2: Storage Rooms, Garage, Stock Room, and other areas of moderate to high combustible loading as defined by NFPA 13 shall have a minimum design density of 0.20 gpm per square foot over the most hydraulically remote 1,500 ft^2. Maximum sprinkler protection area is limited to 130 ft^2.

4. Hydraulic calculations shall be done utilizing the Area/Density method outlined in NFPA 13 and shall entail all pertinent piping including all outside underground extending to the point of the aforementioned confirming water flow test data.
5. Hydraulic calculations shall not be done utilizing the Room Design Method provided in NFPA 13.
6. The design area for all hydraulic calculations shall be a minimum of 1500 square feet for wet pipe systems. The hydraulic calculation shall represent the most remote area. Where sprinkler head locations are not specifically shown, they shall be provided in accordance with NFPA 13 and these specifications to form a complete system.
7. The sprinkler system demand pressure shall be at least 5 psi less than the available pressure from the system adjusted from the effective point of the water flow test.
8. Conduct hydraulic calculations on all renovated systems where changes are made. This includes but is not limited to, changing armovers to flexible drops, modifying the head layout, and any piping modifications increasing the equivalent length.
9. The sprinkler system shall be hydraulically balanced to provide the required minimum density over any area, including the most hydraulically remote area.
10. Calculations shall include the sprinkler system demand and hose stream requirements.

11. The hydraulic calculations shall be based on the Hazen-Williams Formula and use the following "C" values: Unlined Cast or Ductile Iron Pipe: C=80, Cement-Lined Cast or Ductile Iron Pipe: C=120, HDPE/PVC Underground Pipe: C=140, and Black Steel in Wet-Pipe Systems: C=110
12. Hydraulic calculations shall be revised and resubmitted to include all system design modifications, at no additional cost to the owner, until a satisfactory design in accordance with these specifications is provided.
13. A riser name plate shall be permanently affixed to each calculated system riser, providing hydraulic data in accordance with NFPA requirements.

1.4 TESTS

A. The appropriate tests and flushing procedures shall be conducted as the installation progresses, as stipulated by the applicable regulations. Provide all necessary labor and equipment for such tests.

B. All tests shall be witnessed by all interested agencies unless specifically waived by the agency in writing. Adequate advance notification shall be given in writing to all such parties.

C. All pressure testing and flushing shall be in accordance with NFPA 13 requirements.

D. Perform hydrostatic test on sprinkler system, to 50 PSI over maximum pressure but at least 200 PSI for 2 hours. Contractor shall make provisions to isolate the new portion of the system for testing.

E. All defects made evident by the tests shall be properly repaired. Leaks shall be repaired only by means of tightening or replacing the fitting and not by any caulking method.

F. Upon completion of the entire fire protection system installation, an operating test shall be made in the presence of the purchaser, local fire officials, and representative of the authority having jurisdiction.

G. After the completion of testing and adjustments furnish three (3) copies each of signed certificates of approval or acceptance of all parts of the systems, from all authorities having jurisdiction.

H. Provide a copy of the test certificate in the OMM.

1.5 INSPECTION SERVICE

A. After completion of the fire protection system installation and at the start of the guarantee year, complete the National Fire Sprinkler Association, Inc. standard form of "Inspection Agreement"; without charge to the Owner, calling for four (4) inspections of the sprinkler system during the guarantee year. Provide Owner and Architect with a copy of this document.

B. During the guarantee year, inspections shall be made as per the inspection agreement, and as required by the Latest Edition of NFPA 25. In addition to the NFPA 25 requirements, the following maintenance is to be performed during the course of the fourth inspection:

1. Operation of all control valves.
2. Lubrication of operating stems of all interior control valves.
3. Operation of water motor gong and/or electric alarms.
4. Cleaning of alarm valves.
5. Lubrication of fire department hose connection inlets.

PART 2 - PRODUCTS

2.1 SPRINKLER HEADS

A. All sprinkler heads shall be the product of a single manufacturer, UL listed and FM approved. All heads shall be the same model year and style throughout. The Professional must approve any deviations. Sprinkler heads shall be as manufactured by Reliable, Tyco, Victaulic or Viking.

B. All sprinklers shall be permanently marked with a one or two character manufacturer symbol, followed by three or four numbers, so as to identify unique sprinkler identification for every change in orifice size or shape, deflector characteristic, pressure rating and thermal sensitivity.

C. Sprinklers shall have an ordinary temperature rating unless otherwise required by NFPA 13. The temperature rating of the heads shall be selected to correspond with the maximum ambient temperature of space protected or any heat producing objects.

D. Concealed sprinkler head with cover plates having a factory applied or custom color matching finish shall be utilized in all areas having finished ceilings.

E. Upright or pendent type sprinkler heads having a brass finish shall be utilized in all areas without finished ceilings.

F. Extended coverage heads are permitted in corridors and other areas with ceilings. Avoid using extended coverage heads within exposed areas with obstructions due to piping and ductwork. If utilized, the specific requirements of the manufacturer's listing and NFPA 13 shall apply.

G. Provide upright spray type, pendent type, sidewall type, or concealed ceiling type as indicated, or required by the specific application.

H. Sprinkler head guards shall be wire-cage type and include a fastening device for attaching to sprinkler or the pipe. They shall be oriented to provide the maximum accessibility for operation. Pendent or upright heads with guards shall be provided as required.

I. Quick response sprinkler heads shall be provided throughout all light hazard occupancy areas.

J. Sprinkler heads utilized in renovated areas of the existing building, or common compartment areas with the existing building, shall match the thermal sensitivity to those in the existing compartment.

K. Provide a stock of spare heads of each type and rating of not less than the quantities required by NFPA 13. Provide a metal cabinet appropriately labeled for head storage. Mount cabinet in a location chosen by the Owner and include appropriate sprinkler wrench for each type of sprinkler installed.

L. Provide two sprinkler head shutoff tools per each type of head utilized.

2.2 FLEXIBLE SPRINKLER HOSE AND FITTINGS

A. All products shall be listed as per UL 2443, Standard for Flexible Sprinkler Hose with Fittings for Fire Protection Service.

B. Products shall be (as manufactured by):

1. FlexHead (FlexHead Industries)
2. VicFlex (Victaulic Corporation)
3. FSC (Viking Corporation)
4. Approved Equal

C. All products shall be provided with all manufacturer required appurtenances and installed strictly in accordance with the manufacturer's installation instructions and limitations, including but not limited to allowable bends and attachment methods.

D. Flexible sprinkler hose and fittings are not permitted in areas with exposed ceilings. All flexible sprinkler hose and fittings must be concealed above ceilings or in bulkheads and properly mounted and attached.

E. Provide proper length hose for the required installation.

2.3 SPECIALTY SPRINKLER FITTINGS

A. Specialty Fittings shall be UL listed and FM approved. They shall be made of steel, ductile iron, or other materials compatible with piping.

B. Mechanical T Fittings shall comply with UL 213 and have a ductile iron housing with pressure responsive gaskets, bolts, and threaded or locking-lug outlet.

C. Mechanical-Cross Fittings shall comply with UL 213 and have a ductile iron housing with pressure responsive gaskets, bolts, and threaded or locking-lug outlets.

D. Drop-Nipple Fittings shall comply with UL 1474 and have a threaded inlet, threaded outlet, and seals that are adjustable.

E. Sprinkler Drain and Alarm Test Fittings shall be UL listed and utilize a cast or ductile iron body. They shall have a threaded inlet and outlet, a test valve, and orifice and sight glass.

F. Sprinkler Branch-Line Test Fittings shall be UL listed and have a brass body with threaded inlet and capped drain outlet and threaded outlet for sprinkler.

G. Sprinkler Inspector's Test Fittings shall be UL listed utilizing a cast or ductile iron housing. They shall have a threaded inlet, drain outlet, and sight glass.

H. Seismic separation assemblies. Provide a seismic separation assembly at building expansion joints. The assembly shall be UL listed under VIYY. Acceptable products shall be the fire loop by Metraflex or equal.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Connect to the existing sprinkler main at point indicated.

B. Install fire protection risers at location indicated.

C. Furnish all labor, necessary construction equipment, materials necessary for the complete installation of the fire protection system as indicated. All work shall be in strict compliance with all governing state and local code requirements, in full conformity with the best current trade practices and subject to approval of the Architect or his Representative.

D. All work details not covered in these Specifications shall be governed by the requirements of the latest edition of NFPA 13.

E. Install exposed sprinkler piping to provide a minimum of 7'-6" from finished floor to pendent sprinkler deflector or bottom of pipe for upright heads.

F. Piping shall be screwed, welded, flanged or joined with mechanical fittings. All welding shall be performed in conformance with NFPA 13.

G. Insulate connections between pipe fittings, hangers of dissimilar metal against direct contact. Use di-electric insulating flanges and unions.

H. Support all sprinkler piping , as specified in NFPA 13 .

I. Flushing Connections: 4 inch long nipple and cap shall be provided at ends of all cross mains.

J. Reducers shall be eccentric and installed in piping so that piping can be drained.

K. All drain lines including riser drain, alarm drain, inspector's test drain, low points, etc. shall terminate with turned down ells and shall be so located that discharged water will not interfere with normal conduct of business in building. Concrete splash guards shall be provided at grade level beneath all outside drains to minimize soil erosion.

L. Provide inspector's test drain for each valved zone.

M. Provide sleeves for all pipes passing through fire walls and partitions in accordance with the UL listing for the product. Set sleeves before floors and walls are poured. Pack sleeves with fireproofing material to the fire wall equivalent.

N. Make screwed joints with pipe compound applied to male threads only. All cut ends of the pipe shall be carefully reamed to full size. U.L. approved flexible couplings are permitted on all feed mains and standpipe risers.

O. Install butterfly valves with stems at the horizontal position and the handle pointing in the direction of flow. All fire valves shall be monitored with tamper switches.

P. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visits.)

Q. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

R. Sprinkler bulb protector shall be removed by hand after installation. Do not use tools or any other devices to remove the protector that could damage the bulb in any way.

S. All piping and equipment shall be furnished and installed in a manner and in locations avoiding all obstructions and maintaining required head room clearances. Field check before start of any installation.

T. Coordinate locations of all sprinkler heads and piping with ceiling grid pattern, lighting fixtures, columns, HVAC diffusers, all mechanical equipment and other possible obstructions.

U. The contractor is ultimately responsible for:

1. Maintaining all components of the fire protection system free and clear of all dirt, debris, or other potential obstructions.
2. Not storing materials directly on the ground.
3. Making sure that the open ends of piping are plugged or capped during the construction to prevent dirt or debris from entering the pipe where pipes, fittings, and equipment are located in areas subject to dirt or debris.
4. Using methods that prevent damage, deterioration, and other loss during shipping and on-site storage. These include: using padded or strap slings, etc. as appropriate for materials being handled, lifting equipment by lift points provided or recommended by the manufacturer, and storing equipment away from the effects of rain, wind-driven dust, and other similar phenomena.

V. Provide at the base of each riser a placard of 1/8 inch thick, red laminated phenolic material indicating the following design criteria:

1. Design area and density served by riser .
2. Systems controlled by the riser (areas served).
3. Required flow and pressure
4. Allowance for hose streams

3.2 WATER FLOW AND VALVE SUPERVISORY SWITCHES

A. This Contractor shall provide all vane type waterflow switches and valve supervisory switches under this Contract.

B. The Division 26 Fire Alarm Contractor shall furnish and install all necessary wire, conduit, and boxes to properly connect flow switches to the fire alarm system.

C. This Contractor shall coordinate with the Division 26 Fire Alarm Contractor to insure that the flow switches provided are compatible with the fire alarm system and meet the requirements of the NEC.

D. The waterflow switches shall be installed with the retard setting set to between 20 and 30 seconds.

E. Valve position supervisory switches shall be installed on all control valves. This Contractor shall provide all sprinkler valve supervisory switches under this Contract . The Contractor shall also verify the make and model of all valves to ensure that the switches provided are compatible.

3.3 SPRINKLER GUARDS

A. Provide and install guards on sprinkler heads where heads are within 7 feet of the finished floor or wherever sprinklers may be subject to mechanical injury, such as small closets.

3.4 SPECIALTY SPRINKLER FITTINGS

A. Install specialty sprinkler fittings according to manufacturer's written instructions.

3.5 VALVE INSTALLATION

A. Install fire-protection valves, trim, fittings, controls, and specialties according to NFPA 13, manufacturer's written instructions, and the AHJ.

B. Gate Valves: Install fire-protection-service valves supervised-open, located to control sources of water supply except from fire department connections. Provide permanent identification signs indicating portion of system controlled by each valve.

C. All valves installed in horizontal lines shall be installed with the stems horizontal or above. Valve handwheels shall be oriented, when installed, to provide maximum accessibility for operation.

3.6 DEMONSTRATION AND TRAINING

A. Coordinate with section 210100.

B. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information. Provide two 2-hour training sessions.

C. Schedule demonstration with Owner. Allow at least 21 days advance notice.

END OF SECTION

SECTION 220100 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to this Division's Supplemental General Provisions for additional Project requirements.

B. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates and Addenda are a part of this Specification. Contractors and Subcontractors shall examine these provisions as they may affect work under this Division.

C. Contractor shall examine Division 1 Contract Documents for general project requirements.

D. Contractor shall also examine the Contract Documents of all Divisions which may affect and require work under this Division and be responsible for all work required under this Division.

1.2 DESCRIPTION OF WORK

A. This project involves work in an existing operating facility and will require close communication with Owner with regard to access and work hours. Coordinate all work schedules prior to bidding with Owner. When project includes a Construction Manager, all work schedules shall also be coordinated with the Construction Manager, prior to bidding.

B. All Drawings as well as the Specifications for all Divisions shall be defined as the Contract Documents. Contractor shall review entire set of Contract Documents prior to bidding.

C. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both the Specifications and the Drawings.

D. Prior to submitting bid, Contractor shall examine all Drawings and Specifications to develop a complete understanding of the project scope. Contractor shall ask for clarifications during the pre-bid phase of the project. Failure to do so will not relieve the Contractor of their responsibility to perform all required work.

E. Where the project scope involves renovations and additions, it is required that Contractors visit the site of the work and become familiar with the conditions affecting the installation. Submission of a Bid shall presuppose knowledge of such conditions and no additional compensation shall be allowed where extra labor or materials are required because of the lack of knowledge of these conditions.

F. Bid shall include any special phasing requirements related to the construction work as described in the Contract Documents. Coordinate with Division 1.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation shall be considered applicable. In the event that such interferences occur in course of the work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences that may occur during the course of construction shall be brought to the immediate attention of the Architect and Engineer, and the Architect and Engineer's decision, confirmed in writing, shall be final.

H. The following general terms as used within the context of the Contract Documents shall be defined as follows:

1. "Contract Documents" - The complete set of Drawings and Specifications for all Divisions included in the project.
2. "Drawings" - Drawings furnished as part of the Contract Documents.
3. "Contractor" - This Division's Contractor and the Subcontractors to this Division's Contractor.
4. "Responsible" - To perform work required.
5. "Furnish" - To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" - Work which includes the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" - To furnish and install, complete and ready for the intended use.
8. "Equal" - To meet or exceed the standards of the specified products or listed manufacturers.
9. "Mechanical" - HVAC, Plumbing and Fire Protection Divisions as applicable.

1.3 WORK INCLUDES

A. Include all labor, material, equipment, services, coordination, supervision and administration necessary for the proper completion of all work shown. Items omitted, but necessary, to make all systems complete and workable shall be understood to form part of the work.

B. Material for work required to complete installation such as earthwork, concrete, masonry, mortar, reinforcing steel, patching and painting shall be provided as specified in other applicable Divisions covering such work.

C. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Include all testing, test reports, system programming, start-up reports and warranties for each system as outlined elsewhere in these Specifications. Refer to "Operating and Maintenance Manuals" for additional requirements.

1.4 ALTERNATES

A. Refer to this Division's Supplemental General Provisions for a description of alternates.

1.5 PERMITS AND FEES

A. Secure and pay for permits and inspections required for all work related to this Division. Turn over certificates of approval to the Owner or Construction Manager promptly when received, and before payment is made for the work.

B. Give proper authorities notice as required by law relative to the work in their charge. Comply with the regulations regarding temporary enclosures, obstructions or excavations and pay all legal fees involved.

1.6 QUALITY ASSURANCE

A. Work shall be installed in accordance with provisions of all applicable codes, as interpreted by the local Authority Having Jurisdiction (AHJ), as well as any further modifications or regulations published by local or State Authorities.

B. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

C. The following building codes with amendments shall be followed:

1. Ohio Building Code
2. Ohio Fire Code

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Testing and Material (ASTM)
3. Americans with Disabilities Act (ADA) - Americans with Disabilities Act Accessibility Guidelines (ADAAG)
4. Federal Occupational Safety and Health Act (OSHA)
5. NFPA Standards as referenced by the Building Codes.
6. Authority having jurisdiction

1.7 ELECTRONIC MEDIA

A. Electronic drawing files are available to the Contractor from the Engineer for coordination purposes as defined in Division 0 and Division 1.

B. Contractor shall deliver closeout documents on a portable memory device. Portable memory device shall refer to CD, DVD, Flash Drive, external hard drive or any other portable media used for storing electronic files.

1.8 SUBMITTALS

A. Conform to submittal requirements outlined in Division 1 Specifications. Provide Submittals in an electronic format. The file format shall be portable data file (.pdf).

B. Submittal transmittal shall list corresponding Specification Section and a description of item(s) being submitted. Each submittal shall only include items from one Specification Section. Submittals which include items from multiple specification sections will be returned "REVISE AND RESUBMIT."

C. Prepare Submittals with adequate details and dimensions as necessary to clearly show construction. Clearly identify each item on the submittal with designation as indicated on Drawings including location and use. Include with Submittals Manufacturers published descriptive literature, specifications, performance data (normal operating characteristics, curves, ratings, etc.), wiring diagrams and installation instructions. Indicate for each item the operating characteristics, design conditions, features, and optional items that are intended for application on this project. Where contents of Submittal literature include data not pertinent to the Submittal, clearly indicate (highlight) which portion of content is being submitted for review.

D. Contract Documents include scheduled equipment which is the Basis of Design and used to establish design and space requirements. Contract Documents may also include alternative acceptable manufacturers. Where alternative manufacturer's equipment is submitted which alters the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with deviations from the Basis of Design shall be borne by the Owner.

E. If for any reason, the Submittal shows variations from the requirements of the Contract Documents, the Contractor shall make mention of such variation in the letter of transmittal. The Contractor shall note in red on the Submittal any change in design or dimension on the items submitted including changes made by the Manufacturer which may differ from catalog information.

F. Where additional installation drawings, wiring diagrams or other drawings are specified elsewhere as part of the project requirements, they shall be submitted at the same time as the Submittals. Partial Submittals are not acceptable.

G. Contractor shall review each Submittal prior to submission, and check for compliance with the Contract Documents. Corrections shall be noted. Mark with approval stamp prior to submission. Submittals that do not bear the Contractor's approval stamp will be returned without action.

H. The Submittals will be reviewed only for General compliance and not for dimensions, quantities, etc. The responsibility of correct procurement remains solely with the Contractor. The Submittal review shall not relieve the Contractor of responsibility for errors or omissions and deviations from the Contract Document requirements. Submittals which are not required under this Division shall be returned to the Contractor.

I. Where Submittal review format, whether hard copy or software based, includes pre-determined language that includes the word "Approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" or similar verbiage shall be defined as "Reviewed, Exceptions as Noted".

J. After review of submittals by the Engineer, the Contractor shall revise and resubmit if required to establish compliance with the Contract Document requirements. Resubmittal shall include a document with a written response to each of the Engineer's previous comments.

K. The Contractor shall notify the Engineer when all product data and/or shop drawings for all equipment, materials and systems have been submitted for review.

L. The Contractor agrees that Submittals, processed by the Engineer, are not change orders; that the purpose of submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design intent of the project. This understanding is demonstrated by indicating which equipment and material is required, and by what methods of fabrication and installation will be utilized.

M. The Contractor further agrees that if deviations, discrepancies or conflicts between the Submittals and the Contract Documents are discovered, either prior to or after Submittals are processed by the Engineer, the Drawings and Specifications shall control and shall be followed.

N. Final reviewed submittals shall be included in the Operating and Maintenance Manuals. Where Submittals are returned "REVIEWED, EXCEPTIONS AS NOTED", the final Submittals shall be updated to include the exceptions. Upon ordering equipment, order sufficient number of sets of product data literature for the Operating and Maintenance Manuals.

1.9 GUARANTEE AND WARRANTIES

A. Warrant that equipment and all work is installed in accordance with good workmanship practice. All equipment shall be installed in accordance with the Manufacturer's recommendations and shall meet the requirements specified. Any equipment failing to perform or function as specified shall be replaced with complying equipment without cost to the Owner. Warranty shall commence upon acceptance of substantial completion of construction by the Owner. Sign-off of individual equipment start-up procedures shall not activate the warranty commencement.

B. Guarantee against defects in workmanship and materials; repair or replace any defective work, material or equipment within one year from date of formal written warranty commencement. Longer product warranties provided by individual equipment manufacturers shall supersede this one year guarantee; however, the Contractor shall maintain the one year workmanship and materials guarantee for installation of such equipment. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall consist of marked-up Drawings as defined elsewhere in the Specifications. Refer to Division 1 for quantities, special formatting, and additional requirements.

2. The Contractor shall keep one complete set of the original Drawings on the project site on which shall be recorded any deviations or changes from such Drawings made during construction. These drawings shall become the Record Drawings, shall be kept clean and undamaged, and shall not be used for any other purpose other than recording deviations from the original Drawings. At the end of the project, the Contractor shall make electronic .pdfs of these drawings and transfer them onto a portable memory device. Both hard copy drawings and the portable memory device shall be provided as Record Drawings.
3. After the project is completed, the Record Drawings shall be delivered to the Architect/Engineer for inclusion into the Operating and Maintenance Manuals, as a permanent record of the installation as constructed.

1.11 SITE REPORTS AND PUNCHLISTS

A. The Engineer may visit the site periodically during construction and provide written Construction Observation Reports to the Contractor identifying areas where installation does not meet the intent of the Contract Documents. The Contractor shall provide a written response to these reports within 5 business days, indicating the reason the installation is out of compliance with the Contract Documents. After review, the Engineer may or may not require the Contractor to correct the installation. The Contractor shall correct the installation unless the reason for non-compliance is accepted, in writing, by the Engineer or Owner.

B. Final Punch List

1. The Engineer will visit the site to perform a scheduled Final Punch List to identify areas where the installation is incomplete or does not meet the intent of the Contract Documents.
2. If the Engineer is requested to perform the Final Punch List prior to the Contractor being 100% complete with their scope of work, the Contractor shall furnish a Contractor's Completion List, indicating all incomplete work. This list shall be furnished to the Engineer a minimum of 24 hours prior to the scheduled Final Punch List.
3. The Contractor shall respond to each punch list item along with a date, indicating that the item has been completed or corrected.
4. A copy of the Final Punch List with the Contractor's responses shall be included on the Operating and Maintenance Manual.

C. Where on-line documentation management services or project management software requires the author/initiator of a corrective action to close it, and the Engineer is the author/initiator, the following shall apply:

1. When the corrective action is reported as corrected/complete, by either the responsible Contractor or the Construction Manager, the Engineer will assume that the parties responsible for construction have reviewed and approved the correction.
2. By closing the corrective action, the Engineer is in no way approving nor assuming responsibility for the installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials used on this project shall be new and listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, etc.or as approved by the local Authority Having Jurisdiction. Equipment and materials shall be installed or used in accordance with instructions included with the listing or labeling. Where possible, the same brand or manufacturer shall be used for each type of material or equipment. such as.

B. Equipment and materials for the construction shall be the responsibility of the Contractor and shall be protected by the Contractor until formally accepted by the Owner.

C. All Manufacturers of equipment shall verify to the satisfaction of the Contractor and Engineer that their equipment will function properly under the conditions of use, as shown on the Drawings and as specified herein. Dimensions, weights, operating characteristics and all other related appurtenances shall be verified before submittal of shop drawings.

2.2 MATERIAL SUBSTITUTIONS

A. Bids shall be based upon the specified products, suppliers or listed alternatives. The Drawings and Specifications are based on the products specified by type, model, size and suppliers if indicated and thus establish minimum qualities which substitutes must meet to qualify for review.

B. Should the Contractor propose to furnish materials, equipment and/or suppliers other than those specified, submit a written request for substitutions to the Architect or Engineer in accordance with Division 1 requirements. The request shall be an alternate to the original Bid and shall be accompanied with complete descriptive (manufacturer, brand name, catalog number, supplier name and references, etc.) and technical data for all items. Indicate any additions or deductions to the base Bid price.

C. Where substitutions alter the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with the use of a substitution shall be borne by the Owner.

D. Acceptance or rejection of the proposed substitutions shall be subject to approval of the Architect or Engineer. If requested, the Contractor shall submit inspection samples of both the specified and the proposed substitute items for review.

E. In all cases where substitutions are permitted, the Contractor shall bear any and all extra cost of evaluating the equality of the material and equipment to be installed.

F. Where only one Manufacturer or supplier is named in the Contract Documents, the system or equipment shall be provided as specified.

G. Verbal requests or approvals of substitutions shall not be binding on the Architect, Engineer or Owner.

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall follow all safety requirements as defined herein, as described in Division 1 and as defined by Owner safety protocols.

B. Work shall be performed on de-energized equipment in accordance with NFPA 70E.

C. Should suspected hazardous materials be encountered, Contractor shall adhere to procedures, methods and regulations of the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) and immediately notify Owner.

3.2 COORDINATION

A. Take all field measurements necessary and assume responsibility for the accuracy.

B. If any work is fabricated or assembled off-site, assume responsibility for the accuracy of such pre-manufactured assemblies.

C. Install work that is to be concealed within the building construction in sufficient time to secure proper location without delay to the work of other trades.

D. Assume responsibility for location of chases, other openings through masonry and concrete construction. When work cannot be installed concurrent with building construction, arrange for rough-in boxes, sleeves, inserts and other items, as necessary for installation thereof at a later date.

E. If any work is installed so that the architectural design cannot be adhered to, Contractor is responsible for making such changes as Architect may require. Before installing work, report any interferences between work of this Division and work of other Divisions to Architect as soon as discovered. Architect will determine which work must be relocated, or make adjustments to maintain clearances, maximum headroom and to avoid conflict with other work.

F. Become familiar with the construction where work attaches. Review Structural Drawings for coordination of openings. Cut no structural members or slabs without Architect's and/or Structural Engineer's written approval.

G. Exercise caution when working in areas where concealed systems or materials may exist. Any costs for repair of damage incurred shall be the responsibility of Contractor causing the damage.

3.3 PROTECTION

A. All finished surfaces shall be protected from damage and spills during construction.

1. Protect finished floors with a heavy duty flexible fiber reinforced floor protection board - Ram Board or equal.
2. When setting up pipe cutting and threading machines, protect area against staining and abrasion. Provide plywood protection over Ram Board underlayment.
3. Protect finished surfaces from chips and cutting oil by use of a chip receiving pan and oil proof cover.

4. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
5. Protect finished surfaces from paint droppings, insulation adhesive, etc. by use of drop cloths.

B. The Contractor shall provide protection for any roof areas that will be affected by this scope of work. The roof protection shall be positioned such that it provides protection from falling objects such as tools and materials.

C. The cost of correcting any such condition will be charged against the respective Contractor.

3.4 EQUIPMENT INSTALLATION

A. Install equipment in accordance with equipment manufacturer's published installation instructions.

B. Should the Drawings and/or Specifications include procedures that exceed or call for materials that differ from the manufacturer's instructions, the Contractor shall follow the Drawings and/or Specifications. This requirement does not release the Contractor from the obligation to follow all other published instructions and installation recommendations. Contractor shall make Engineer aware, in writing, of discrepancies between the Drawings and Specifications and the manufacturer's published installation instructions, and/or confirm Engineer's design intent, prior to installation of the equipment. Failure to comply may result in reworking the equipment installation or replacement of materials associated with the equipment at no additional cost to the Owner.

3.5 CUTTING AND PATCHING

A. All cutting and patching in construction as necessary for installation of this work shall be the responsibility of this Division and performed by the Tradesmen related to that specific Division of work. Subcontract this work to the appropriate Trade Division.

B. Do not cut any structural member, including but not limited to steel framing and structural floors, without specific permission from the Architect and/or Structural Engineer.

C. Do not cut openings in roof or floor construction without specific permission from the Architect and/or Structural Engineer. Existing roof warranty must be maintained.

D. Where locations of penetrations are inaccurate or where building components are improperly cut by inadequate methods, the Contractor in error shall be responsible for complete repair.

E. The Contractor shall assume responsibility for removing and replacing existing ceiling tiles as required for installation of all work. Areas include that as outlined by the project scope and areas outside the scope where the Contractor is required to make connections to existing systems and install new work. Damaged tiles shall be replaced.

3.6 SERVICE SHUTDOWNS

A. This project involves remodeling of existing areas in an operating facility. Plan work including alterations and connections to existing facilities, to permit carrying on normal building functions. When necessary to temporarily interrupt a service, shutdowns shall be scheduled through the Owner and shall be done at a time as directed by the Owner. No additional compensation shall be allowed for these shutdown periods even though premium time work may be required unless specifically defined in Division 1.

B. Provide temporary service to equipment or systems that cannot be shut down, and as determined by Owner, or as described in the Contract Documents. Remove temporary services when permanent work is completed

C. Provide a minimum of one week notice to the Owner before any service shutdown is scheduled.

3.7 INDOOR AIR QUALITY

A. All occupied areas of building shall remain free from odors, fumes, dust and smoke generated from installation of material and equipment.

B. Arrange with the Owner to schedule isolation of areas where paints, adhesives, solvents, etc., will be used. Areas shall remain isolated until all materials have cured sufficiently as to stop out-gassing of fumes or odors and area has been ventilated to remove all detectable traces of odors and fumes.

C. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas.

END OF SECTION

SECTION 220101 - PLUMBING SUPPLEMENTAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to 22 01 00: Plumbing General Provisions for additional Project requirements.

1.2 ALTERNATES

A. Division 22 does not have alternates.

1.3 PERMITS AND FEES

A. Make payments to all Public Utilities for work performed by them in providing service connections, including tap-in fees.

1.4 QUALITY ASSURANCE

A. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

B. The following building codes with amendments shall be followed where applicable:

1. 2017 Ohio Mechanical Code
2. 2017 Ohio Plumbing Code
3. 2015 International Fuel Gas Code

C. Lead-free Compliance

1. In compliance with "The Reduction of Lead in Drinking Water Act" signed into federal law on January 4, 2011 and in effect as of January 4, 2014, all applicable products and materials installed shall meet the standard of ANSI/NSF 372 pertaining to any wetted surfaces of pipes, pipe fittings, plumbing fittings, and plumbing fixtures having a weighted-average lead content of no more than 0.25% (0.20% for solders and flux) when used in applications intended to convey or dispense water for human consumption through drinking or cooking.
2. Model numbers specified herein may or may not reflect manufacturer's updated compliant versions; however distinguishing product identification is required of the manufacturer per the ANSI/NSF 372 standard. It is the intent of this specification to specify only compliant versions of any model or product whether a revised number is available, or not at the time of this printing.
3. It is the responsibility of the installing contractor to secure only compliant materials, equipment, components, etc. for installation. Formerly made versions or models of equipment containing non-compliant components are not acceptable.

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
2. ASHRAE 90.1--2010: Energy Standard for Buildings
3. American Society of Mechanical Engineers (ASME)
4. ASME BPVC-2010: Boiler and Pressure Vessel Code
5. American Society of Sanitary Engineers (ASSE)
6. American Water Works Association (AWWA)
7. American Welding Society (AWS)
8. Cast Iron Soil Pipe Institute (CISPI)
9. National Fire Protection Association (NFPA)
10. NFPA 70-2017: National Electric Code
11. NSF International

1.5 SUBMITTALS

A. Prior to commencing work, submit product data and/or shop drawings for Plumbing equipment, materials and systems as required in each individual Division 22 Specification section. Provide all Submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.

B. Prefabricated Plumbing Assemblies: submit fabrication diagrams complete with all components, hardware, fastening, shipping reinforcement, and field connection points.

1.6 CONSTRUCTION DOCUMENTATION

A. Pressure Tests and Disinfection

1. Submit pipe system pressure testing and disinfection documentation to Engineer upon completion.
2. Refer to Section 220300 for additional information.
3. Final copies shall be included in the Operating and Maintenance Manuals.

1.7 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall reflect as-built conditions and show changes in:

a. Size, type, capacity, etc. of any material, device or piece of equipment
b. Location of any device or piece of equipment
c. Location of any outlet or source in building service system.
d. Routing of any piping, conduit, sewers or other building services.

2. Record Drawings shall indicate the location of all underground, under floor and concealed piping.
3. Record Drawings shall indicate rated walls where firestop materials have been applied.
4. Record Drawings shall indicate the location of all tagged valves including the tag designations.

B. Operating and Maintenance Manual (OMM)

1. Once submittals are completed, provide an OMM index to the Engineer for review. Once index is approved, submit an electronic copy of the OMM to the Engineer for acceptance.

2. Furnish electronic Portable Document Format (PDF) of Operating and Maintenance Manuals. Refer to Division 1 Specifications for additional requirements.
3. Each OMM shall be assembled into one electronic file or multiple files broken up by section if the file size is larger than 15Mb.
4. Combine all electronic files and arrange as follows, unless otherwise directed in Division 1 Specifications. Include a title tab for each section and an index at the beginning of each individual section. If a section listed below does not apply to the Project, renumber sections accordingly. Multiple files broken up by section are allowed if file size is greater than 15Mb.

   a. First Page --- Title of Project, Owner, Address, Date of Submittal, Name of Contractor and Name of Engineer, including contact information, phone numbers and email addresses.
   b. Second Page --- Index. Index shall include hyperlinks to each section listed.
   c. First Section --- Written description of system contents including where actually located in building, how each part functions individually, and how system works as a whole. Included step by step procedures for startup and shut down for each system and piece of equipment. Conclude with a list of items requiring service and either state the service needed or refer to the Manufacturer's data in the file that describes the proper service.
   d. Second Section --- A copy of each approved Submittal.
   e. Third Section --- A copy of each equipment Manufacturer's operating and maintenance instructions and where applicable, a copy of the equipment startup report. Maintenance instructions shall include name of service agency, spare and replacements parts lists, lubrication instructions, and replacement belt information (size, type and length). For packaged equipment with manufacturer supplied controls, provide information listing any programming that is not a factory default.
   f. Fifth Section --- A copy of all test results performed by the Contractor. Test results shall include pipe pressure tests and disinfection. Wall hung fixture carrier sign-off approvals
   g. Sixth Section --- A copy of all valve directories.
   h. Seventh Section --- A copy of all guarantees and warranties.
   i. Eighth Section --- Owner training sign-in sheets including all data utilized in the training sessions and a list of all digitally recorded training sessions.

      1) Include electronic format of all recorded training sessions on portable memory device (Optical media or USB stick).

   j. Ninth Section --- Record Drawings.

k. Tenth Section --- A list of attic stock furnished for the project.
l. Eleventh Section --- Final Punch List with Contractor's responses.

5. The electronic OMM shall be delivered to the Owner and Engineer on portable memory device or other optical media - Owner shall be provided with up to 5 copies on separate portable memory devices or optical media and the Engineer shall be provided with a single copy.

   a. OMM index page shall have cross-reference links to each section.
   b. Sections containing more than 30 pages shall have a section index with cross-reference links.
   c. PDF text shall be recognizable and shall be searchable by use of a "Ctrl-F" or "find text" function.

1.8 OWNER TRAINING

A. Before final payment, demonstrate to the Owner's satisfaction the proper operation of each of the systems provided as part of the Contract Documents.

B. Provide to Owner after all equipment, systems and controls are in operation and at an agreeable time, instructions for the purpose of training Owner's maintenance personnel in the operation and maintenance of all Plumbing equipment, systems and controls.

C. Provide a "sign-in" sheet at each training session. A copy of each "sign-in" sheet shall be included in the Operating and Maintenance Manual.

D. Refer to individual Division 22 sections for minimum time periods for training.

E. Deliver to the Owner all special tools and appurtenances for proper operation and maintenance of the equipment provided and request receipt for same. Attach to the Contractor's request for final payment.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Consult the Contract Documents and Submittals pertaining to the work for other trades. Review the field layouts for all trades and make adjustments accordingly in laying out the Plumbing work.

B. Examine the work of all other trades when it comes in contact with, or is covered by, work in this Division. Do not attach to, cover up, or finish against any defective work, or install work in a manner which will prevent proper installation of the work of other trades. Plumbing Contractor shall be responsible for the costs of adjustments required.

3.2 PRODUCT HANDLING

A. Pay all costs for transportation of materials, equipment to job site.

B. Provide all scaffolding, tackle, hoists, rigging necessary for placing Plumbing materials and equipment in their proper place. Scaffolding, hoisting equipment: comply with applicable Federal, State, and Local regulations. Remove temporary work when no longer required.

C. Arrange for packaging of equipment, which must be hoisted, so that there will be no damage or distortion caused by hoisting operation. Protect all piping, ductwork, and equipment from any damage during hoisting operation.

D. Store equipment, fixtures, controllers, insulation, etc., in dry location and protect from dirt and moisture until building is ready to receive them.

E. Coordinate location of stored items with other trades. Where necessary, store materials and equipment on movable carts so they may be moved when interfering with the work of other trades.

3.3 DAMAGE AND EMERGENCY REPAIRS

A. Assume responsibility for any damage to new or existing building components caused by work provide as part of the Contract Documents, including leaks in piping systems being installed or reworked. Repair all damage without extra cost to Owner.

B. Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during warranty period.

C. Restore roads, grounds, paving, insulation, piping, building components, etc., to their original condition whenever this work causes damage.

3.4 CLEANING

A. At all times keep premises and building in neat and orderly condition, follow explicitly any instructions in regard to storing of materials, protective measures and disposing of debris.

B. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Thoroughly clean all piping, fixtures and equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

C. All debris created by the execution of this work shall be removed as directed by the Architect or Owner.

D. Upon completion of work remove all tools, equipment and surplus materials.

3.5 PAINTING

A. Finish painting is included under Division 9 - Finishes, except where specifically called for in Section 220300.

B. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.

C. No equipment or piping shall be painted before being tested.

D. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match existing finish.

3.6 INDOOR AIR QUALITY

A. Provide temporary ventilation and/or filtration systems of sufficient size and quantity to ensure complete removal of all odors, fumes, and airborne contaminants generated. Maintain 25 feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

B. If the building HVAC system is used and adjustments are made for ventilation purposes, rebalance systems to maintain occupied areas pressurization and air change requirements.

C. Arrange with Owner to override the HVAC system control of night setback functions to assist with ventilation of building.

D. Comply with SMACNA guideline "IAQ Guidelines for Occupied Buildings Under Construction" Second Edition - 2007.

END OF SECTION

SECTION 220200 – PLUMBING DEMOLITION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Plumbing equipment, piping and systems indicated on the Demolition Drawings are shown to indicate the extent of demolition only and not intended to be a record drawing of the existing conditions. The Drawings and Specifications establish the minimum standards for workmanship and materials.

1. If additional interpretation is required regarding the scope of demolition, contact the Engineer prior to bid.

B. Include all labor, materials, equipment, services, and permits necessary for completion of the demolition work.

C. Provide protection for all adjacent areas before, during, and after execution of the demolition work.

D. Comply with all the rules and regulations of local and state Authorities Having Jurisdiction, including applicable OSHA safety requirements.

E. Visit the site and become familiar with conditions affecting the demolition work. No additional compensation shall be approved on claims that arise from a lack of knowledge of the existing conditions.

F. Normal building functions shall be maintained during the demolition work. Coordinate the day and time of any temporary building system interruptions with the Owner. Additional compensation shall not be approved for premium time effort.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment for completion of the demolition work as described within the Specifications and on the Drawings.

B. Materials and equipment shall be new and UL labeled for the application.

PART 3 - EXECUTION

3.1 GENERAL DEMOLITION WORK

A. Disconnect and remove existing Plumbing Work made necessary because of Project alterations as indicated or implied on the Contract Documents of all trades. Relocate equipment and/or devices where indicated. Existing Plumbing equipment, piping and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not.

B. Plumbing equipment, piping and systems shall be de-energized prior to disconnection and removal.

C. Demolition Work under this Contract shall be accomplished by the Contractor in complete accordance with the Construction Procedure and Progress Schedule specified under Division 1. Proposal shall include any special phasing requirements related to demolition work as described in the Division 1 Specifications.

D. Remove existing equipment indicated including piping connections. Existing equipment shown as being reused or relocated shall be carefully removed, stored on the premises, and refurbished before reinstallation.

E. Equipment to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for delivery to the Owner. All other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

F. Remove all previously abandoned equipment and piping encountered above existing ceilings.

G. Where required, re-support existing to remain piping above ceilings being removed.

H. Remove piping as described on the Drawings. Cap or plug as indicated or as required by Code. Insulate portion of system left exposed by the piping removal. Insulation shall match that of the existing adjacent insulation or be as specified for new service. Identify in the field where piping connections are to be reused.

I. Provide drainage, capping, and re-filling as necessary to isolate portions of systems to enable full or partial demolition.

J. Provide valves as necessary whether indicated or not to isolate portions of systems to enable full or partial demolition and to make ready for re-connection of the new work.

K. For portions of existing piping systems to be re-used, visually inspect for signs of leaks. Report any such cases immediately upon discovery to the Architect or Engineer. Should any compromised pipe be discovered, notify Architect and Engineer immediately.

L. For portions of under-slab drainage piping not intended for re-use, the following shall be required:

1. No dead ends shall be created.
2. No open end pipe shall be left behind and buried.
3. Portions of existing piping not indicated to be re-used can become abandoned to minimize floor removal, however abandoned piping shall be capped or plugged at both or all ends.
4. Any portion of existing piping impeding the installation of new piping shall be removed and bedding re-established.
5. Branch laterals no longer used shall be capped at the branch connection to the main at the wye, or as close as possible, to avoid removal and replacement of portions of mains.
6. Any under-slab venting acceptable under a previous code shall be permitted to remain in effect provided it is a necessary vent for an existing portion of drainage intended to remain.
7. Addition of a cleanout shall not substitute for provisions herein to eliminate being a dead end.

M. Maintain necessary venting for any fixture(s) to remain as a result of partial demolition or project phasing. If necessary, provide temporary venting to ensure proper fixture operation.

N. Maintain necessary recirculating hot water for any fixture(s) to remain as a result of partial demolition or project phasing. If necessary, provide temporary circuits and valves to ensure proper fixture operation.

O. Cutting, patching, finishing, etc., for removed or relocated Plumbing equipment, piping and systems shall be included as part of the Plumbing Work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing construction. Patching shall be performed by the qualified trade.

P. Where equipment, piping and systems are removed from fire or smoke rated construction, penetrations shall be patched to match existing ratings with suitable materials matching existing construction. Patching shall be performed by the qualified trade.

Q. Remove and reinstall existing ceiling tiles in areas outside the scope of demolition work as required to complete the demolition work outlined within these Specifications or indicated on the Demolition Drawings. Damaged tiles shall be replaced to match existing.

END OF SECTION

SECTION 220300 - PLUMBING BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Materials

1. Pipe and Fittings
2. Pipe Joining Systems
3. Valves
4. Strainers
5. Unions
6. Dielectric Connections
7. Expansion Compensators
8. Floor, Ceiling, and Wall Plates
9. Equipment Pads
10. Sleeves
11. Inserts, Hangers, and Supports
12. Roof Flashings
13. Electrical Connections
14. Vibration Control
15. Nameplates, Markers, and Tags

B. Methods

1. General Installation Requirements
2. Access to Equipment and Devices
3. General Piping Installation
4. Pipe Joining
5. Welding
6. Expansion Compensation Installation
7. Installation of Sanitary Drainage Systems
8. Installation of Domestic Water Supply System
9. Domestic Water Hygiene
10. Installation of Natural Gas System
11. Startups
12. Tests and Adjustments
13. System and Equipment Identification
14. Excavation and Backfill

1.2 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. Submit product data for all piping, materials and manufactured items listed in paragraph 1.1 WORK INCLUDES. Exceptions: Floor, Ceiling and Wall Plates, Sleeves and Paint.

C. Engineered Thermal Expansion and Contraction Systems: Submit manufacturer's engineered stress analysis, calculated movement and management, details, and diagrams with components and hardware locations IE; guides, anchors, flexible connections, flexible loops, bellows, spring supports, etc.

1.3 CONSTRUCTION DOCUMENTATION

A. Refer to Section 220101.

B. Submit pipe pressure test and disinfection documentation upon completion of testing and disinfecting. Include final copies in the Operating and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 PIPED SYSTEMS

A. Application schedule of required pipe materials and joining:

PIPE AND JOINING APPLICATION SCHEDULE			
PIPED SYSTEM	PIPE SIZE RANGE	PIPE SPECIFIED TYPE (s)	JOINING SPECIFIED METHOD(s)
Domestic Water Inside Building	2" and smaller	Cu-L	Soldered, or Pressed fitting system
Trap Primer Feed Piping Beneath Slab on Grade	1/2"	PEX-AL or PEX	"Without joints"
Natural Gas Underground House-Line	All	BS1/HDPE1	Flanged/Heat Fused
Natural Gas Inside Building	2" and smaller	BS sch40	Threaded
Natural Gas Inside Building	2-1/2" and larger	BS sch40	Welded and/or Welded Flanged-Spool Sections
Natural Gas Outside Building Above Ground	2" and smaller	BS sch40	Threaded
Natural Gas Outside Building Above Ground	2-1/2" and larger	BS sch40	Welded
Compressed Air	2" and smaller	Cu-K	Pressed fitting system
Exterior Sewers Outside of	All	PVC-DWV	Push Joint

Building		sdr35	
Sanitary Drainage, Waste and Vent Piping - Above Ground	1-1/2" to 15"	CI-NH	No-Hub coupling, or MG fitting
Sanitary Drainage, Waste and Vent Piping -Underground	2" to 16"	PVC-DWV	Solvent Weld
Sanitary Drainage, Waste and Vent Piping - Above Ground (Not in HVAC Plenums)	1-1/2" to 16"	PVC-DWV	Solvent Weld
T&P Relief Piping	1/2" to 1-1/2"	Cu-L	Soldered, or Pressed fitting system
HVAC Equipment Condensate Drains	1/2" to 1-1/2"	Cu-L	Soldered, or Pressed fitting system

2.2 PIPE AND FITTINGS SPECIFICATIONS

A. BS sch40: Schedule 40 black steel (ASTM A53). Fittings for black steel pipe - 150 PSIG, steam working pressure malleable iron screwed fittings on sizes through 2 inches and standard factory formed welding fittings on sizes over 2 inches.

B. BS1/HDPE1: As required by the serving utility but not less than Schedule 40 black steel (ASTM A53) coated pipe per ANSI B36.10 or high density polyethylene "Drisco 8300" meeting local gas company requirements.

C. CI-NH: No hub cast iron pipe and fittings (ASTM A888, CISPI-301). Acceptable Manufacturers:Charlotte, Tyler, or AB & I.

D. Cu-K: Type "K" hard drawn seamless copper tube (ASTM B88). Fittings for copper pipe - wrought copper solder joint type (ASME B16.22). Where silver brazing alloy is used to join pipe and fittings, fittings to be suitable for brazing (ASME B16.50).

E. Cu-L: Type "L" hard drawn seamless copper tube (ASTM B88). Fittings for copper pipe - wrought copper solder joint type (ASME B16.22). Where silver brazing alloy is used to join pipe and fittings, fittings to be suitable for brazing (ASME B16.50).

F. PEX: Cross-linked Polyethylene (PEX) Type b, shall conform to (ASTM F876), (ASTM 877), (CSA 137.5) and (NSF 61) (NSF®us-pw). Tubing shall have a Standard Dimensional Ratio (SDR-9), with a 100 psi at 180°F / 160 psi at 73°F pressure, temperature rating, a "5006" or CL 5 chlorine listing and a 5306, or UV 3 ultraviolet exposure listing.

G. PEX-AL-PEX: Multi-layer polyethylene cross-linked tubing with aluminum sheathing and polyethylene external layer shall conform to (ASTM F 1281) and fittings (ASTM F1282), (CSA 137.5) and (NSF 14 and 61) (NSF®us-pw). Tube shall have a Standard Dimensional Ratio designation (SDR 9), with a 100 psi at 180°F / 160 psi at 73°F pressure, temperature rating, a "PEX5006" chlorine resistance rating, and extended UV rating.

H. PVC-DWV : Schedule 40 PVC solid core DWV pipe and fittings per ASTM D2665 with solvent-weld socket fittings for schedule 40 pipe. Acceptable manufacturers: Charlotte Pipe, JM Eagle, Lasco, North American Pipe Corporation, or Spears.

I. PVC-DWV sdr35: Unplasticized Polyvinyl plastic PSM piping with a wall thickness of Class SDR-35. Pipe sizes 4 inch thru 15 inch meeting ASTM D3034. Pipe sizes 18 inches and larger meeting ASTM F679. Joints for pipe with integral gasket bell ends meeting ASTM D3212 and the sealing gasket conforming to ASTM F477. Solvent cement joints meeting ASTM D2855. Acceptable manufacturers: Charlotte Pipe, JM Eagle, Lasco, North American Pipe Corporation, or Spears.

2.3 PIPE JOINING SYSTEMS:

A. Copper Press System: Where listed for acceptable joining method in above application schedule, the following press system may be used.

1. Press Fittings - Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.
2. Installation must be in accordance to manufacturer's instructions and specifications.
3. Manufacturer - Viega Pro-Press or equivalent by NIBCO, or Apollo.

2.4 VALVES

A. Provide all valves of the same manufacturer where possible.

B. Valves in domestic water shall be "Lead Free": Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤0.25% per Safe Drinking Water Act as amended January 4th 2011 Section1417.

C. Manufacturers: Valve basis of design are of NIBCO manufacture. Other acceptable manufactures

1. Apollo
2. Hammond
3. Jomar
4. Milwaukee
5. Watts

D. Provide valves with joining ends to match that of the specified piped system(s).

E. Utilize adapter fittings only when listed valve manufacturer does not offer suitable ends for joining to the specified piped system's joining.

F. Pressed piping systems may have valves of the same manufacturer of the pressed piping joining system providing they meet criteria of valves specified below.

G. Valves for Water Filled Piping

1. Valves in water piping 2 inches and smaller - Two-piece ball valves with cast silicon bronze body, Teflon seats, full port, blow-out proof stem, adjustable packing gland, stainless steel or silicon bronze ball, soldered, Press or threaded ends, minimum 150 WSP, 600 WOG. Provide thermoplastic extended handle for 2" of insulation. Conform to ASTM, NIBCO S/T/PC 585-66-LF Series.
2. Horizontal check valves in water piping 2 inches and smaller: swing type design, Class 125, 200 WOG, with silicon bronze body and cap with threaded, Press or soldered ends. Conform to ASTM. NIBCO 413-LF
3. Vertical check valves in water piping 2 inches and smaller: 250 WOG. Center guided, silent, non-slam type. Bronze body, spring, and disc holder, threaded ends. NIBCO 480-Y-LF

H. Valves for Compressed Air Systems (Non-Medical)

1. Shutoff valves for Piping - 2 inches and smaller, U.L. listed ball valve, 175 PSI working pressure, cast bronze body, Viton seals, full port, threaded ends, stainless steel trim, AGA certified and UL listed for flammable liquids and LP gas. NIBCO T-585-70-SV.

I. Valves for Natural Gas Piping Systems (Downstream of Utility Service Meter)

1. Shutoff valves for Natural Gas Piping - 2 inches and smaller, U.L. listed ball valve, 175 PSI working pressure, cast bronze body, Viton seals, full port, threaded ends, stainless steel trim, AGA certified and UL listed for flammable liquids and LP gas. NIBCO T-585-70-UL or T-580-70-UL.
2. Shutoff valves for Natural Gas Piping - 2-1/2 inches and larger, ASME/ANSI compliant API approved ball valve. Class 150 carbon steel fire safe split body, stainless steel vented full port ball valve with blow out proof stem, stainless steel trim, flanged ends. NIBCO F-515CSF66FS.

2.5 STRAINERS

A. 2 inches and smaller, 'Y' type pipe line strainer, brass or bronze body, threaded ends, 304 stainless steel screen with 20 mesh openings, 400 PSIG at 210 degree F. Complete with solid retainer cap and gasket. WATTS Series 777 or equivalent by CLA-VAL, Conbraco, Febco, or Wilkins.

2.6 UNIONS

A. Unions in steel piping 2 inches and smaller: Malleable iron, ground joint brass to iron seat suitable for 175 PSI working pressures.

B. Unions in copper piping 2 inches and smaller: Cast brass solder fittings with machined and lapped seats suitable for 175 PSI working pressures.

C. Unions in stainless steel piping 2 inches and smaller: Type 304/304L stainless steel, threaded type with VicPress 304 ends.

D. Unions on all piping 2-1/2 inches and larger: Use flanged connections. Gaskets used with flanged fittings: 1/16 inch thick, ring type, compressed graphite sheet.

2.7 DIELECTRIC CONNECTIONS

A. Provide at connections between copper and ferrous metal piping materials in domestic cold water systems ASTM F441, Schedule 80, CPVC threaded pipe nipples, 4 inches minimum length. Provide for dielectric connections in pipe sizes 2 inches and smaller.

B. Provide at connections between copper and ferrous piping in domestic hot water systems Victaulic Clearflow dielectric waterway Style 47. Fitting consists of zinc plated casing with a chemically inert NSF/FDA listed dielectric thermoplastic lining.

2.8 EXPANSION COMPENSATION

A. Expansion Loops - Provide field constructed piped expansion loops where indicated on plans - refer to Part three Execution herein.

B. Expansion compensators: Water Filled Piping: In lieu of piped loops where they cannot be fit, or where specifically indicated on plans, provide NSF 61 compliant lead-free compensator devices. All units shall be specifically sized for adequate expansion allowance and submitted accordingly. Selections shall take into account length of pipe runs, temperature of medium, and piping size and material.

1. Horizontal piping

a. Flexible hose loop type: 'X', 'Y', and 'Z' plane compensating manufactured assembly complete with two parallel sections of corrugated bronze metal hose (ASTM B465 / ASTM B103) housed compatible braid (ASTM B105), copper 180 degree return bend with integral support bracket, and inlet and outlet field connections available in solder (ASME B16.18 / ASME B16.22) or press-able (IAPMO PS 117) end extensions. Maximum Working Pressure: 150 PSIG. Maximum Operating Temperature: 250 degrees F. Metraflex Model UPC Metraloop.

2. Manufacturer - Metraflex as listed above or equivalent by Kevlex or Flexonics.

C. Expansion Compensators - DWV vertical piping: For non-metallic solvent welded PVC piping systems, non-restrictive slip-type expansion compensators at required interval spacing per pipe manufacturer's requirements to allow axial movement without lateral with the for hot wastes' thermal expansion and or building contraction and settlement. Spears Model No. S119 and 826 or approved equivalent.

D. Pipe Guides - Guides consisting of steel segmented spider sized to the outside diameter of the pipe or insulation and free to move axially at the segmented steel cylinder. Provide a minimum of 2 guides on each side of expansion compensators or expansion joints and elsewhere as indicated. Provide guides of length recommended by manufacturer to allow required travel. Metraflex or equivalent by Keflex, Fee and Mason or Flexonics.

E. Pipe Anchoring: Install in conjunction with guides as required.

2.9 FLOOR, CEILING, AND WALL PLATES

A. Fit all pipe passing exposed through walls, floors, or ceilings in finished rooms with steel or brass escutcheons. Where surface is to receive a paint finish make escutcheons prime painted; otherwise make escutcheons nickel or chrome plated. Where piping is insulated, fit escutcheons outside insulation.

2.10 EQUIPMENT PADS

A. Except where otherwise noted, provide pads for all floor mounted equipment installed under this Division.

B. Construct equipment pads of 3000 pound concrete complete with all necessary anchor bolts, sleeves anchor plates, washers and nuts. Smooth all exposed portions of pads and bevel corners.

C. Unless otherwise noted, make all equipment pads a minimum of 4 inches thick.

2.11 SLEEVES

A. Where pipes pass through masonry or concrete walls, set machine cut steel pipe sleeves 1 inch larger than outside diameter of pipe, with ends of sleeves flush with wall faces. Sleeves in partitions other than masonry or concrete where firestopping is required: 28 gage galvanized steel sheet.

B. Where pipes pass through floors, set Schedule 40 galvanized steel pipe sleeves 1 inch larger than the outside diameter of the pipe. Top of sleeve to be 4 inches above finished floor in machine rooms and wet floor locations.

C. Where pipes are insulated, provide sleeves large enough to allow insulation to pass through sleeve. Center pipes in sleeves.

D. Set sleeves true to line, grade; position and plumb or level and so maintain throughout construction period.

E. Where concrete or masonry walls are core drilled for pipe passage steel sleeves are not required.

F. Provide fire stopping between pipe and sleeve or opening as required to maintain the integrity of the fire rating of all walls and floors.

2.12 INSERTS, HANGERS, AND SUPPORTS

A. Manufacturer: Basis of design shall be Anvil. Other acceptable manufacturers include Mason, Holdrite, or Erico/Caddy.

B. Support all piping from building structure with appropriate attachment. Do not support from another pipe, ductwork, ceiling framing, or metal roof deck. Where fireproofing is removed or damaged to allow attachment to building structural members, repair to maintain integrity of fireproofing.

C. Provide installation to properly support and retain piping, equipment and related conduits and connections. Install in a manner to control expansion, contraction, water hammer, sway, and vibrations with the appropriate anchorage and guides, sway bracing, and rodding restraints.

D. Provide supplementary angles, channels, and plates where necessary between building structural members to achieve adequate spacing of piping and equipment supports as required by code and this specification. Attach supplementary materials to building structural members by welding, bolting or anchors without compromise to the building's structure.

E. Provide all inserts for support in concrete construction and forged steel beam clamps when attaching to steel construction. Pressed steel beam clamps are not permitted. Provide threaded rods, turnbuckles, and all other miscellaneous specialties for the attachment of hangers and supports to structure. Provide additional lock nut on each threaded support rod.

1. For up to 3/4 inch diameter rod: Anvil Figure 92, 93, or 94 beam clamps.
2. For up to 7/8 inch and 1 inch diameter rod: Anvil Figure 134 beam clamp with Anvil Figure 290 eyenut.

F. Hanger Rod Size Application

1. For steel, ductile iron, or cast iron pipe:

a. 3/8 inch threaded rod for; 1/2 inch through 2 inch nominal pipe size.
b. 1/2 inch threaded rod for; 2-1/2 inch through 3-1/2 inch nominal pipe size.
c. 5/8 inch threaded rod for; 4 inch through 5 inch nominal pipe size.
d. 3/4 inch threaded rod for; 6 inch through 8 inch nominal pipe size.
e. 7/8 inch threaded rod for; 10 inch through 12 inch nominal pipe size.
f. 1 inch threaded rod for; 14 inch through 18 inch nominal pipe size.

2. For copper and plastic(s) pipe:

a. 3/8 inch threaded rod for; 1/2 inch through 2 inch nominal pipe/tube size.
b. 1/2 inch threaded rod for; 2-1/2 inch through 5 inch nominal pipe/tubing size.
c. 5/8 inch threaded rod for; 6 inch nominal pipe/tubing size.
d. 3/4 inch threaded rod for; 8 inch through 12 inch nominal pipe/tubing size.

G. Provide support saddles where pipes are insulated. All insulation shall be continuous through all hangers.

H. Suspended Piping Hangers

1. Uninsulated piping 2 inches and smaller - Anvil Figure #69 adjustable swivel ring.
2. Uninsulated piping 2-1/2 inches and larger - Anvil Figure 260, Carbon Steel adjustable wrot clevis type.
3. Copper tubing (uninsulated) - Anvil Figure CT-69 carbon steel ring and malleable iron adjusting nut completely copper plated.

4. Insulated piping 2 inches and smaller - 18 gage galvanized steel shield (Anvil Figure 167) over insulation in 180 degree segments, minimum 12 inches long with Anvil Figure 260 adjustable clevis type hanger. Or option of using Insulation Saddle System by ANVIL, Figure. #260ISS. ASTM A36 Carbon Steel Clevis Hanger with V-Block Hi Impact Glass reinforced Polypropylene Saddle with low thermal conductivity of .77 (BTU-Sq.Ft. - Hr-Deg F), Flammability Rating Dual Listed ASTM E84 and V-0 UL 94, and Carbon Steel Spacer.
5. Rollers - Where thermal movement causes a hanger rod to deviate more than five degrees from the vertical or where longitudinal expansion may cause a movement of more than 1/2 inch in the piping, use and install roller hangers or chairs, Anvil Figure 181, 171, or 175.
6. Plastic piping systems: 18 gauge galvanized steel shield (Anvil Figure 168) over 180 degrees of bottom of pipe, length as recommended by manufacturer. Use with Anvil Figure 260 adjustable clevis type hanger.

I. Suspended Piping Hanger Spacing

1. Hanger spacing intervals, at a minimum, shall comply with project's referenced Plumbing Code’s maximum spacing allowance as listed for various pipe materials. However, should the pipe manufacturer's installation criteria have more stringent spacing (less distance), it shall be followed.
2. For systems and piping materials not covered by the project's referenced Plumbing Code, the piping system’s manufacturer’s installation criteria shall govern to uphold the system’s warranty for considerations of content medium’s temperature and pressure.
3. For Natural gas and / or Propane (LP) systems: comply with the project's referenced version of the International Fuel Gas Code / NFPA 54 for spacing as follows for specified schedule 40 black steel piping:

   a. For 1/2 inch piping; 6 feet max spacing.
   b. For 3/4 inch and 1inch piping; 8 feet max spacing.
   c. For 1-1/4 inch and larger piping; 10 feet max spacing.
   d. Vertical piping of any size; every floor level.

4. For other than fuel gas systems: steel piping systems of schedule 40 or more, and where codes only calls for 12 foot spacing regardless of pipe size, it is considered inadequate for smaller sized piping. Alternatively, provide spacing as follows:

   a. For 1/2 inch through 1-1/4 inch piping; 7 feet max spacing.
   b. For 1-1/2 inch piping; 9 feet max spacing.
   c. For 2 inch piping; 10 feet max spacing.
   d. For 2-1/2 inch piping; 11 feet max spacing.
   e. For 3 inch and larger piping; 12 feet max spacing per code.
   f. Vertical piping of any size; every floor level but to exceed 15 feet.

J. Provide additional hanger support within two feet of each elbow and at valves, strainers and other equipment in pipe lines.

K. Provide additional supports where necessary to maintain proper alignment for copper and plastic pipe and tubing.

L. Support cast iron DWV piping at every hub or coupling within 18 inches of hub or coupling. Installations requiring multiple joints within a 4 foot developed length shall be supported at every other or alternating hubs or couplings. Supports shall not exceed 10 feet between hangers. Vertical components shall be secured at each base stack. Provide additional supports where necessary to maintain proper alignment and grade.

M. Trapeze hangers may be used for multiple runs of piping in lieu of many individual runs. Construct trapeze style support with steel angle or channel-strut products. Provide with adjustable hanger rods and hardware capable for the combined loading. The Contractor shall be responsible for confirmation with engineering representation of such products and hold all liability. Determine trapeze spacing by the smallest pipe supported within the combined run. Install all piping free for independent movement on the trapeze hanger. Provide insulation protection, saddles, and dielectric safeguards similar to that of individually specified supports.

N. Vertical Piping Support

1. Vertical piping support intervals and required guides, at a minimum, shall comply with project's referenced Plumbing Code's maximum spacing allowance as listed for various pipe materials. However, should the pipe manufacturer’s installation criteria have more stringent spacing (less distance), it shall be followed.
2. For systems and piping materials not covered by the project's referenced Plumbing Code, the piping system's manufacturer’s installation criteria shall govern to uphold the system’s warranty for considerations of content medium’s temperature and pressure.
3. Support vertical pipe risers with adequate means for expansion, contraction, and building settlement. Ensure integrity of floor sleeves and fire-stopping. Refer to expansion compensation of this section.

O. Secondary Pipe Positioning and Supports

1. Field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of all secondary piping shall be done by means of engineered methods that comply with IAPMO PS 42-96.
2. Pipe Clamps in Plenum-Rated Environments: All non-metallic clamps must meet ASTM E-84 25/50.
3. Hubless Cast Iron Soil Pipe Restraints: CISPI 310-11 complainant engineered restraints comprised of 16 GA, CRS, Galvanized straps and/or heavy duty black steel or galvanized pipe clamps with stainless steel bands, and galvanized steel hardware.
4. Manufacturer: Hubbard Holdrite or equivalent by Erico/Caddy, or Sioux Chief.

2.13 ROOF FLASHINGS

A. For membrane type roofs; roof flashings for plumbing are part of the membrane roofing system and provided under another Division of the Specification. Coordinate closely with general trades.

B. For non-membrane roofs; construct flashing material of 4 pound lead with minimum thickness of 1/16 inch.

1. Provide flashing around each pipe extending through the roof. Extend flashings a minimum of 12 inches in all directions from the pipe or roof drain body. Solder sleeves on vent extensions, extend to top of vent and turn down 2 inches inside.

2. Clamp flashing securely to roof drain body to make watertight and airtight connection.
3. Coat all surfaces of the lead flashing including the edges with the same material as used by the roofing installer.

2.14 ELECTRICAL CONNECTIONS:

A. Refer to those portions of the Contract Documents which establish electrical characteristics and furnish equipment to operate on that service.

B. Starters shall be provided under Division 26 Work, unless otherwise noted. Starters to be provided with proper NEMA enclosures, surface or flush application as required. Where equipment has magnetic starters furnished as an integral part of the equipment, disconnect switches shall be provided under Division 26 Work.

C. Provide coordinated wiring diagrams for motor equipment of plumbing system conforming to operation specified. Provide line diagrams, power diagrams, terminal connections. Submit all such drawings as shop drawings.

2.15 VIBRATION CONTROL

A. Furnish and install vibration isolating mountings to isolate from the structure, by means of resilient vibration and noise isolators, mechanical equipment having rotating or reciprocating parts. Guarantee that isolators to provide isolation efficiencies according to this Specification. Base selection on equipment purchased, power dissipated, frequency, weight distribution and nature of the building structure.

B. Design mountings to permit attachment to the equipment base or pad and to the structure and select for uniform deflection allowing for unequal weight distribution.

C. Provide selections by the manufacturer of the mountings to provide a transmissibility not exceeding 10 percent.

D. Vibration or noise created in any part of the building by the operation of any equipment furnished and/or installed under this Contract will be prohibited. Take all precautions by isolating the various items of equipment from the building structure.

E. Isolate plumbing equipment as follows:

1. Mount reciprocating compressors directly on steel spring vibration isolators in combination with compressed molded fiberglass noise isolators. Provide isolators with 95 percent isolation efficiency.

F. Support piping independently of the mechanical equipment and isolate as follows:

1. Support all suspended piping in Mechanical Equipment Rooms and the first three hangers outside equipment rooms from the overhead structure by threaded rods incorporating resilient hangers. Hangers shall contain steel springs and pre-compressed molded fiberglass inserts designed for static deflections of between 1 inch and 1-3/4 inch under operating conditions.

G. Base isolator efficiency on the lowest operating speed of the supported equipment. Furnish as part the isolator manufacturer's submittal data, deflections and isolating efficiencies for the isolators supporting each piece of equipment.

H. Manufacturer: Mason Industries, Vibration Eliminator Co., Kinetics Noise Control or VCM Group.

2.16 NAMEPLATES, MARKERS AND TAGS

A. Equipment Nameplates:

1. Equipment nameplates shall be laminated phenolic with a black surface and white core. Use 1/16 inch thick material for plates up to 2 inch by 4 inch. For larger sizes use 1/8 inch thick material.
2. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use ¼ inch minimum height letters which occupy four to the inch.
3. Nameplates shall be attached to equipment with brass screws or rivets; no adhesive attachments will be permitted.
4. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

B. Valve Tags:

1. Tags shall be 2" diameter, 1/16" thick, multilayered acrylic with engraved letters.
2. Lettering shall be ¾" high for type service and ½" for number. Tag shall indicate service and valve number. Letter and number designations shall be coordinated with the Owner.
3. Each service shall be a different color in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI/ASME A13.1).
4. Tag shall be attached with chain similar to Seton No. 16 stainless steel jack chain. Use of beaded chain or wire is not acceptable.
5. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

C. Pipe Markers

1. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI/ASME A13.1).
2. Flow direction arrows shall be included on each marker.
3. Snap-around markers shall be used for overall diameters up to 6" and strap-around markers shall be used above 6" overall diameters.
4. Underground pipe markers shall be detectable tape, color coded and labeled same as indoors.
5. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Location of piping, equipment, etc., on the drawings are diagrammatic; indicated positions shall be followed as closely as possible, exact locations shall be subject to building construction and interferences with other work. In general, conceal piping located outside of equipment rooms. Difficulties preventing the installation of any part of work as indicated, shall be called to the attention of the Architect. Architect will determine locations and changes. Contractor shall install the work accordingly. Architect reserves right to make minor changes in location of any part of the work up to the time of roughing-in without additional cost.

B. Attempts have been made to identify existing equipment locations and piping routing and sizes with use of existing drawings and field observations. Contractor shall field verify all existing information, report any discrepancies to the Architect or Engineer and note on the Record Drawings.

C. At locations in project involving alterations, assume responsibility for removal, rerouting, protection and replacement of existing facilities as necessary to install new work. Work to be executed by craft which customarily or by jurisdictional award performs such service. Refer to 22 02 00 for additional information.

D. Coordinate all work with the phasing of the Project. Certain services must remain active to serve occupied areas during construction. Coordinate all phasing requirements with the Owner.

E. Install all materials and equipment in a neat and workmanlike manner by competent specialist for each subtrade. The installation of any materials and equipment not meeting these standards may require removal and reinstallation at no additional cost to the Owner.

F. Locate piping and other services, in pipe spaces, to ensure maximum accessibility. Where necessary to cross pipe spaces, crossing must be made near the floor or 6 feet or more above floor.

G. Install, connect equipment, services, and materials according to best engineering practice and in conformity with manufacturer's printed instructions. Provide complete auxiliary piping, water seals, valves, electric connections, controls, etc., as recommended by respective equipment manufacturer or required for proper operation.

H. Take all measurements and determine all elevations at the building.

3.2 ACCESS TO EQUIPMENT AND DEVICES

A. All valves, equipment, and other devices requiring examination, adjustment, service, and maintenance shall be accessible. If located above drywall ceiling or behind finished walls, provide an access door. Coordinate all access door locations with the Architect and General Trades.

B. To ensure accessibility during and after construction, when a device is installed, its location shall be marked with securely attached temporary signage. Signage shall indicate the amount of clearance required for the specific device. Signage shall remain in place until the ceiling or access door is installed or until substantial completion.

C. Clearance shall include not only code required clearance but also clearance for Owner's staff to access the device. This access shall be from the floor or from the floor level using normal maintenance ladders and apparatus to meet all OSHA requirements. Consideration shall be given to accessing a device through an access door.

D. Where a device is installed above finished ceilings, signage shall be hung below the device at the finished ceiling level. Where a device is exposed, in open ceiling areas, signage shall be hung at approximately 8' above the floor level.

E. Plumbing Contractor shall monitor these access locations until substantial completion and notify Architect, Owner and Engineer when the access area is encroached upon so that corrective action may be taken immediately.

F. Corrective action shall be the responsibility of the trade encroaching the access area unless identified that the equipment in question is installed incorrectly.

3.3 GENERAL PIPING INSTALLATION

A. Drawings (floor plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

C. Provide shutoff valves at all branch connections to main, at all fixture groupings, each piece of apparatus, and in mains to sectionalize the systems and elsewhere as indicated.

D. Install gate valves with stems at 45 degrees or greater above the horizontal position.

E. Install ball and butterfly valves with the stems at the horizontal position and the handle pointing in the direction of flow.

F. Install all valves and equipment with unions or flanges or grooved couplings to facilitate removal.

G. Provide hose end drain valves with cap at all low points, trapped sections and on equipment side of all branch valves to permit draining of all or part of liquid piping systems.

H. Pipe equipment drip bases to nearest drain.

I. Locate covered piping a sufficient distance from walls, other pipe, ductwork, or other obstacles, to permit application of the full thickness of insulation specified; if necessary, use extra fittings and pipe.

J. Use Dielectric Connectors where pipe materials change from ferrous to copper.

K. Make piping connections to equipment and fixtures indicated.

L. Install all piping, including shut-off valves and strainers, to pumps, and equipment line size with reduction in size being made only at inlet to pump or equipment. Install outlet piping from pump or equipment, full size of outlet connection. Increase to line size and install piping, check valves, strainers and shut-off valves line size.

M. Plug open ends of pipe or equipment at all times during installation to keep dirt and foreign material out of system.

N. Arrange and install all pipes, valves, cleanouts, access openings and equipment so as to be accessible for service. Locate equipment to maintain clearances for tube pulling, periodic servicing.

O. Unless otherwise specified, make branch connections in welded steel piping less than 2/3 of main size with weldolets, butt, or threaded type. Make branch connections 2/3 of main size and larger with weld tees, laterals, or crosses. Shaped nipples are not acceptable.

P. Make reductions in piping lines with reducing coupling.

Q. Support piping so as not to place a strain on valves or equipment.

R. Install all overhead wastewater pump discharge piping with adequate support, and as required, additional sway bracing to prevent pipe movement upon pumping cycles. Installations with excessive long pipe runs and / or long hanger rods are more subject to movement and are not acceptable.

3.4 PIPE JOINING

A. Joint methods shall be as previously specified in this section for the respective piped systems.

B. All pipes must be reamed and cleaned before assembly. Apply pipe compound to male end of threaded joints. Make all welded joints as previously specified.

C. Assemble soldered copper pipe by cleaning, fluxing, and soldering per ASTM B32 with lead free solder and fluxes, except where a silver brazing alloy is specified.

D. Make solvent welded joints in PVC and CPVC piping with compatible solvents and/or cleaning chemical specified by manufacturer of the particular brand piping being installed. Contractor shall be responsible for safeguarding against incompatible solvents and cleaners and to maintain all product warranties.

E. Make push-on joints in underground PVC piping with elastomeric gaskets meeting ASTM F477.

F. Make pressed joints, in type-B, PEX tubing systems per the tubing manufacturer's instructions with use of only fittings and hardware of the same manufacturer as the tubing, or expressed acceptable OEM components and tooling to assure product system warranty.

G. Make pressed joints, in type-B, PEX-AL tubing systems per the tubing manufacturer's instructions with use of only fittings and hardware of the same manufacturer as the tubing, or expressed acceptable OEM components and tooling to assure product system warranty

H. Make heat fused joints for high density polyethylene piping per manufacturer's specifications and tooling.

3.5 DWV NO-HUB CAST IRON PIPE JOINING

A. Provide code required CISPI 310-11 complainant anchorage and restraints in cast iron hubless piping system for 5 inch in size and greater.

B. Make joints in above ground no-hub cast iron pipe systems for sanitary, waste, vent and drain piping with engineered couplings comprised of rubber/elastomeric ribbed or grooved gasket, stainless steel shield band, and multiple stainless steel clamping comprised of either 1/4, 5/16, or 3/8 inch drives. The following coupling application indicates duty classes and shall be the minimum required for the project. The contractor may option to exceed the minimums to utilize one clamp for the entire project at no extra cost.

1. Joints located in systems with less than 50 feet of elevation above.

a. For sizes through 2 inches, provide standard duty, CISPI 310 compliant as manufactured by Tyler, Anaco, Ideal, Clamp-All Corporation, or Husky.
b. For sizes 2-1/2 inches and larger, provide 80 inch pound torque hubless soil pipe couplings. Provide Clamp-All Corporation Model 80, Husky Series 2000, Ideal MD, or Mission HW coupling conforming to FM1680 class one and ASTM C1540.

3.6 PRESS FIT JOINING SYSTEM INSTALLATION

A. Install Press System according to manufacturer's recommendations.

B. Pipe shall be fully inserted into the fitting and pipe marked at the shoulder of the fittings.

C. The fitting alignment shall be checked against the mark on the pipe to assure the pipe is fully engaged (inserted) into the fitting.

D. Joint shall be pressed using the tool provided by the manufacturer.

3.7 WELDING:

A. Install all pressure piping systems to conform to requirements of State Piping and Welding Codes where applicable.

1. Perform any pipe welding not covered by code by certified welders according to code procedures.
2. Construct, install, and inspect all pressure piping systems according to the requirements of ASME B31.1.0.

3.8 EXPANSION

A. Install all piping throughout the project with adequate allowance for expansion to prevent damage to building, equipment, and piping. Provide anchors, loops, expansion compensators, or expansion joints for complete control of movement.

1. In addition to the normal design documents, Contractor shall be responsible for taking extra precaution with cold weather installs prior to the building enclosure being completed. Upon the internal building's temperature warm-up, further than normal expected expansion will be experienced. Partial temporary leave-outs portions of long vertical runs are necessary.

B. Water distribution piping, both vertical and horizontal, shall have field piped loops or compensators to limit straight runs. Install compensators having access for inspection and to enable future replacement. Retain manufacturer's labeling and be visible and provide shut-off valves before and after with enough pipe run, or unions. Provide access doors where necessary.

C. Drain, waste, and vent piping stacks shall also have protection from pipe expansion, building settlement and creep. Hot wastes shall have extra precaution to safeguard to expansion and pipe slope compromise with horizontal to vertical change in direction.

1. Cast iron no-hub systems have inherent ability with the no-hub coupling.
2. Non-metallic systems shall have expansion compensators installed at required interval spacing per pipe manufacturer's requirements.

D. Make changes in directions with fittings.

E. Make branch connections to mains for domestic hot water risers with at least two (2) 90 degree elbows.

F. Bullhead connections in any piping service are prohibited.

G. Supplement all loops, joints, compensators, etc. with adequate guides located as close to loops and joints as possible to preserve alignment and pitch. Provide control rods to prevent overextension or compression.

H. Securely attach pipe guides to the building structure.

I. Provide securely supported pipe anchors as required to control expansion, contraction in piping.

J. Locate the first pipe guide 4 pipe diameters from the expansion joint or expansion compensator. Locate the second pipe guide 14 pipe diameters from the expansion joint or expansion compensator. Install pipe guides according to manufacturer's recommendations.

K. Provide for expansion in Grooved Piping Systems according to manufacturers published literature.

3.9 SANITARY DRAINAGE SYSTEMS

A. Run all drainage and vent piping as direct as possible. Install drains, soil, and waste piping in an actual location to meet the various building conditions. Do any work necessary to conceal piping or clear piping and ductwork of other trades.

B. Slope branch soil, and waste pipes at an incline of at least 1/4 inch per foot of run, and main house drain at 1/8 inch per foot unless noted otherwise. Make changes in direction of drainage piping by means of "Y" branches and 1/4, 1/8 or 1/16 bends except that sanitary 'T's and crosses may be used on vertical stacks. Make no unnecessary bends or offsets, where changes in direction are unavoidable make with bends of not more than 45 degrees.

C. Provide cleanouts at base of all stacks, at changes of direction and as indicated. Where more than one change of direction occurs in a run, only one cleanout is required for each 40 feet of developed length of drainage piping. Extend cleanouts on underground lines flush with finished floor or grade. Provide cleanouts not over 50 feet on center along straight runs. Install cleanouts same size of pipe up to 4 inch in diameter. Provide pipe over 4 inch in diameter with a 4 inch cleanout. All cleanouts shall be accessible.

D. Lay all sanitary sewers with full length of each section resting on a solid bed. Lay pipe starting at upgrade with spigot end of pipe pointing in directions of flow.

E. Encase in concrete all sewers 14'-0" or more below grade.

F. Provide engineered no-hub joint restraints for hubless cast iron piping greater than 4 inch in size in accordance with the CISPI installation at changes in direction and at changes in pipe size of two or more in accordance with the CISPI installation handbook.

G. Terminate vent pipes at least 12 inch above roof utilizing black pipe. For built-up roofing make each vent terminal watertight with the roof by using sheet lead (4 psf) with base not less than 12 inches in all directions from center of pipe, and collar full height of pipe and turned down 2 inch inside of pipe. Maintain a minimum distance of 10 feet from any type of outdoor air intake.

3.10 DOMESTIC WATER SUPPLY SYSTEM

A. Install water system as indicated with hot and cold water being supplied and connected to all fixtures and equipment.

B. Pitch all water piping to drainage points, provide hose end drain valves at such points.

C. Provide domestic water piping to trap primers for all floor drains as required.

D. Provide pressure gauge with shutoff cock on cold water service line inside building.

E. Provide reduced pressure back flow preventers and install where indicated.

F. Provide pressure regulating valves for all specialized water using equipment such as ice machines or dishwashers. For dishwashers, install valve at inlet to booster water heater. Reduced pressure to be 20 PSIG.

G. Provide strainers upstream of all pressure regulating valves, centralized thermostatic mixing valves, building's water service backflow preventers, and as indicated elsewhere.

H. Provide water hammer arrestors on all cold and hot water lines at each group of fixtures and at isolated individual fixtures having flush valves, hose sprays, and electronic quick closing activation. Install and size per manufacturers requirements and in an accessible location - provide access door as needed.

I. Provide water hammer arrestors in water lines before all quick closing valves such as at dishwashers and washing machines. Install and size per manufacturers requirements and in an accessible location - provide access door as needed.

J. Provide unions at all equipment valves, strainers, etc., to facilitate removal for repair or replacement without disturbing adjacent piping.

3.11 DOMESTIC WATER HYGIENE

A. Provide every effort to safeguard against the risk of pipeline pathogen growth during the construction timeframe. Execute measures prior to the final system cleaning and disinfection obligation. Such precautions shall include, but not be limited to:

1. Securing and protection of pipe, avoid open pipe ends in dirty environments and outdoor weather.
2. Obtain testing water from a clean source. Flush the filling apparatuses and maintain its cleanliness prior to use. If delivered water is necessary, document for record its source of origin.
3. Be leery of ambient conditions above 60°F and its effect on water filled uninsulated piping. In summer months, a greater risk is prevalent. This includes un-enclosed jobsites and boiler rooms.
4. Testing water duration and longevity within piping; avoid long durations of water filled pipe without any use. Limit duration in piping with no-use or little-use to a maximum of 72 hours.
5. Avoid stagnation in any portions filled, and flush regularly throughout the duration of construction, or drain. Document for record.
6. Provide sectional valving, whether shown or not, that may be ideal to portion off for testing or jobsite-use purposes. Drain piping after testing if it is not needed until project close out.
7. Purge dry any drained portions with nitrogen or verified clean compressed air at acceptable low pressures of the pipe material. Confirm process with the pipe manufacturer.
8. For necessary water filled portions, provide enabling ports to provide safe chlorination similar to requirements for the final obligation.
9. Avoid hot water system production to sit idle and cool down from setpoint high temperatures. Rather, drain while of temperature safely to appropriate drain receptor not exceeding 140°F.
10. Delay installation of fixture outlet fittings, strainers, hand held showers, eye-wash hoses, and faucet aerators if possible.

B. Final Cleaning and Disinfection

1. Re-fill and flush new system. Install, or remove and clean and re-install fixture outlet fittings and aerators. Clear any debris in preparation for final system disinfection.
2. Prior to building turn-over and project close out, disinfect all newly installed and/or repaired potable water piping systems prior to occupant utilization as required by the Plumbing Code.
3. Chlorination procedures shall conform to that prescribed by the local health department or water purveyor having jurisdiction. In absence of such, procedures described in AWWA Specification C651 or AWWA C652, or that listed in the plumbing code itself shall be acceptable.
4. All flushing and chlorination shall be fully documented and submitted by the plumbing contractor for liability and project close-out. Include documentation and sample test reports in the Operating and Maintenance Manual.

3.12 NATURAL GAS PIPING SYSTEM:

A. Install new gas service from street main including all metering and regulating equipment. Install underground gas service with a minimum of 2 feet of cover.

B. Provide insulated Dresser coupling where gas piping is connected to meters. Protect Underground gas piping with Hill-Hubbell wrapping or "Extru-Coat" with joints protected with "Scotch" wrapping, but not less than as required by the serving utility for their piping.

C. Provide anodic protection on underground piping conforming to utility company standards.

D. Conform to utility company requirements for installation. Provide full line valved bypass around meter after pressure regulator. Provide lockable valve, lock and 5 keys to Owner.

E. When polyethylene pipe is installed underground, provide a No. 12 gauge copper wire installed in the bottom of the trench to "trace" pipe.

F. Connect to all building equipment requiring gas. Install line size dirt leg (of three inch nipple minimum), shutoff valve, and union prior to reducing pipe size to equipment connection size.

G. Gas piping underground inside building, install in a sealed schedule 40 steel conduit vented to building exterior. Do not install valves or unions on natural gas piping in return air plenums.

H. Provide pressure reducing or pressure regulating valves with vent piping sized per manufacturer's recommendations and route piping to the outside. Terminate piping away from outside air intakes.

I. Where pressure regulating valves are provided with external pilot, install piping between pilot and regulator.

3.13 STARTUPS

A. Coordinate schedule for start-up of various equipment and systems. Notify Construction management prior to start-up of each item.

B. Verify that pre-start checklists, tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

C. Execute start-up by service technicians employed or authorized by the manufacturer to provide startup service according to manufacturer's instructions.

D. Provide a factory authorized representative for startup of the following equipment. Representative shall be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

1. Domestic water heaters

E. Provide written reports that equipment and systems have been properly installed and are functioning correctly. Where start-up is by a factory authorized representative, report shall be on manufacturer's forms intended for the purpose. Reports shall be included in the Operating and Maintenance Manual.

F. Equipment and systems not installed properly or operating correctly shall be corrected or replaced and its proper operation shall again be verified. This Contractor shall be responsible for the costs of any and all re-inspections.

3.14 TESTS AND ADJUSTMENTS

A. Obtain all inspections required by law, ordinances, rules, regulations of authorities having jurisdiction, furnish certificates of such inspections. Pay all fees, and provide all equipment, power and labor necessary for inspections and tests.

B. During testing period maintain on the project an engineer thoroughly familiar with all phases for as long a period as required to thoroughly adjust all systems and demonstrate that they are functioning properly.

C. Perform all tests, including but not limited to those specified, make necessary adjustments to obtain specified equipment and system characteristics.

D. Do not consider work under this Specification complete until required inspections have been obtained, tests performed, necessary adjustments made, and satisfactory evidence of compliance has been submitted. Architect reserves right to make spot checks to determine accuracy and completeness of final adjustments.

E. Piping Pressure Tests

1. All piping shall be given the following pressure test without pressure drop. Equipment which would be damaged by the required test pressure shall be isolated from the system during test.

    a. Domestic Water within Building; hydrostatic test @125 PSIG for (6) hours.
    b. DWV Systems; sanitary sewers per State Plumbing Code and/or Local Authority
    c. Natural Gas; air test per International Fuel Gas Code (NFPA 54) test procedures.
    d. Compressed Air; air test as follows:

        1) For steel and copper piped systems with design operating pressure of 115 PSIG or less, test with compressed air @ 1-1/2 times the system operating pressure for (6) hours.
        2) For steel and copper piped high pressure systems with design operating pressure above 115 PSIG, provide incremental multiple steps testing. Submit planned testing prior to test. Test with compressed air @ 1-1/2 times the system operating pressure for (6) hours.
        3) For UL listed non-metallic or UL listed engineered compressed air piping systems, follow manufacturer's requirements for testing.

2. Correct any leaks by re-making a failed joint or replacing entirely with new joining materials. Once complete, re-test and prove prior to pipe covering and labeling. Patch remedy repairing is not acceptable.
3. Perform all tests before piping is concealed or covered.
4. Be responsible for completely draining the systems after hydrostatic tests are performed. Any damage from freezing prior to acceptance of the completed installation shall be repaired at no additional cost to the Owner.

5. All tests shall be scheduled and documented. Include copy of the piping system pressure test reports in the Operating and Maintenance Manual.

3.15 PAINTING

A. Division 9 Contractor shall be responsible for the painting of all exposed equipment, iron work, supports, hangers, pipe, and pipe covering, except factory finished items, installed in the Contract.

B. Clean and prepare items to be painted as recommended in the paint manufacturer's printed recommendations.

3.16 SYSTEM AND EQUIPMENT IDENTIFICATION

A. Equipment Identification

1. Identify each piece of scheduled equipment as to nature of service and system number corresponding to designation in Contract Documents, by two color engraved nameplates. Equipment designations shall conform to the Owner's Standard.
2. Equipment such as but not limited to:

   a. Water Heaters
   b. Expansion Tanks
   c. Pressure Reducing Valve Stations
   d. Remote Motor Starters
   e. Remote Switches, Pilot Lights

B. Valve Identification

1. Identify all valves with tags attached with chain. Local valves need not be tagged. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve directory. All letter and number designations shall be coordinated with the Owner.
2. Designations and locations shall be accurately recorded on the Record Drawings.
3. At completion of project, provide a framed valve directory, under Plexiglass, giving number of valve, service, and building location by column coordinates, floor location, manufacturer's figure number, size, and equipment controlled. For service, use designation shown in legend on drawings. Mount where directed by Owner.

C. Pipe Markers

1. Identify each new and existing pipe connections, in Equipment Rooms, above accessible ceilings and in accessible shafts. Labels shall match those on drawings.
2. Markers shall be located:

   a. Adjacent to each valve
   b. At each branch
   c. At each cap for future
   d. At each riser takeoff
   e. At each pipe passage through wall (each side)
   f. At each pipe passage 20' - 0" intervals maximum
   g. At each piece of equipment
   h. At all access doors.

i. A minimum of one (1) marker shall be provided at each room.

3. Provide detectable tape on underground piping exterior to the building.

3.17 EXCAVATION AND BACKFILL

A. Do all excavation and backfilling necessary for installation of work.

B. Prior to opening an excavation, determine whether underground installations; i.e., sewer, telephone, water, fuel, electric lines, etc., will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, determine the exact location and when it is uncovered, provide proper supports for the existing installation. Contact and advise Utility companies of proposed work PRIOR TO THE START OF ACTUAL EXCAVATION.

1. Contact Ohio Utilities Protection Service 48 hours prior to starting work. Telephone 1-800-362-2764

C. Dig trenches to exact grade and depth with only sufficient dirt removed at holes to provide working space. Dig bell holes to insure pipe resting for its entire length upon bottom of trench. Refill trenches dug below required depth to proper depth with sand. Dig trenches not more than 18 inches wider than external diameter of pipe and sides practically perpendicular. Shore or sheet pile trenches if necessary to prevent caving. Do not endanger work of other contractors or existing structures. Contractor will be held solely responsible for damage.

D. In event that rock is encountered during excavation, notify Architect at once. In event that shale is encountered or any condition such that it is not possible to provide a flat even grade in bottom of trench, lay pipe line in a bed of sand of sufficient depth to properly support pipe.

E. After installation and testing of piping has been completed and approved for backfill, refill all excavation inside of building and under paved areas outside of building with number 57 backfill per ASTM D-448 or ODOT No. 304 or the previously excavated material if this excavated material is determined by the Architect to be suitable for reuse. Backfill and tamp in 6 inch layers. Refill trenches outside of building and not under paved areas with selected dirt as specified under Division 31 "Earth Work" to 6 inches above finished grade to provide for settlement.

F. Where sand is used for backfill provide compacted clay bulkheads to prevent groundwater in sand from draining to building.

G. Remove, dispose of any material not used for backfill.

H. Take special care to protect trees and shrubbery adjacent to trenches. If roots of live trees are encountered in excavation, protect as directed.

I. Provide, operate, pumping equipment as necessary to keep trenches, other excavations, free of water. Do not install piping in trenches until trenches have been pumped and bottom dried out sufficiently to receive piping.

J. When excavation is necessary in an existing lawn, re-sod to match existing lawn, as approved.

K. Where trenches cross roads, walks, or public through fares, provide suitable barricades and bridges adequately protected by signs or red flags during day and lights at night.

L. Repave all streets or sidewalks disturbed to satisfaction of Architect and authorities having jurisdiction.

END OF SECTION

SECTION 220400 - PLUMBING FIRESTOPPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work of this Section includes, but is not limited to, furnishing and installing firestopping for fire-rated construction in the following areas:

1. All openings in fire-rated floor, wall, ceiling and roof assemblies, both empty and those accommodating penetrating items.
2. Openings at each floor level in shafts or stairwells.
3. Empty openings intentionally designed as spare openings in fire rated Construction.

B. Penetrating items shall include the following:

1. Cables.
2. Conduit.
3. Pipes without insulation.
4. Pipes with insulation. All insulation must remain intact, undamaged and shall run continuously through walls and floors.

1.2 QUALITY ASSURANCE

A. General

1. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings required by local building code and as tested by nationally accepted test agencies per fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance of the assembly being penetrated.
2. Manufacturer¢¢s engineering judgments will be accepted for non-standard applications or where no tested system exists. Drawings for engineering judgments must indicate the UL tested system or systems upon which the judgment is based, in order to evaluate the engineering judgment against a known performance. Engineering judgments shall be approved by the Architect.
3. Firestopping materials and systems shall be capable of closing or filling openings created by:

   a. The burning or melting of combustible materials.
   b. Deflection of materials due to thermal expansion.

4. Firestopping material shall be non-halogenated, lead and asbestos free and shall not incorporate nor require the use of hazardous solvents.
5. Firestop products which dissolve in water after curing are not acceptable.
6. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to a Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Manufacturer's Field Representative: The Manufacturer of the firestop material of this Section shall provide a qualified field representative at the site.

D. Pre-Installation Conference: Contractor shall hold a pre-installation conference with representatives of the Architect, Contractor, Installer, Materials Manufacturer and various trades involved in the Work, to review conditions affecting the installation and consistency of manufacturer to be used by all trades.

E. Conform to Manufacturer's printed instructions for installation in accordance with a U.L rated system or Manufacturer¢¢s engineering judgement.

F. Codes and Standards

1. ASTM E 84
2. ASTM E 119
3. ASTM E 814
4. UL 263
5. UL 1479

1.3 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. All submittals shall conform completely to the requirements of the Contract Documents.

C. Product Data: For each type of material to be installed, literature shall indicate product characteristics, typical uses, performance, test data and Manufacturer's installation procedures.

D. Shop Drawings: Include U.L. rated system number and details for each type of penetration or configuration.

1. Show typical installation details including:

a. Minimum and maximum allowable annular spacing.
b. Base material composition.
c. Firestop materials selected.
d. Applied thickness required to achieve the hourly rating.

E. Where required, submit Product Data and Shop Drawings to the Authority Having Jurisdiction (AHJ) for review and approval. Information shall include the Manufacturer's assembly detail with UL system number, technical data and installation instructions for each penetration type occurring on the project.

F. Close-out Documents

1. Final approved product data and shop drawings of all materials installed shall be included in operating and maintenance manuals.
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer¢¢s labels identifying product and manufacturer, UL label, date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes. Materials shall be stored off the ground and protected from environmental conditions as required by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.5 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, provide for curing in accordance with manufacturer suggested temperature requirements.

B. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

C. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

D. Do not use materials that contain flammable solvents.

E. Do not install water based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.

1.6 PROTECTION

A. Where firestopping is installed at locations which shall remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.7 SEQUENCING

A. Coordinate this work as required with work of other trades.

B. Firestopping shall precede finishing of gypsum board.Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal deck placement or composite deck installation but before placement of concrete.

1.8 WARRANTY

A. Contractor shall provide written certification that all firestopping was installed in accordance with the Manufacturer's written instructions for UL tested assemblies and that all firestop systems installed meet firestopping requirements as herein specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials shall meet the requirements specified herein.

B. For applications where combustible penetrants are involved, i.e. insulated or plastic pipe, a suitable intumescent material must be used.

2.2 ACCEPTABLE MANUFACTURERS

A. Specified Technologies, Inc. (STI)

B. 3M

C. Hilti, Inc.

2.3 FIRESTOP MATERIALS

A. Firestop Mortar

B. Intumescent Firestop Sealants and Caulks

C. Elastomeric Firestop Sealants and Caulks

D. Endothermic Firestop Sealants and Caulks

E. Firestop Putty

F. Rough-in Box Inserts

G. Firestop Pillows/Blocks

H. Fire Rated Pathways

I. Firestop Grommets

J. Firestop Collars

K. Wrap Strips

L. Cast in Place Devices

M. Firestop Foams

N. Composite Sheets

O. Intumescent Gaskets

PART 3 - EXECUTION

3.1 GENERAL

A. In an occupied building, permanent firestopping shall be installed within 24 hours of penetrating a fire rated assembly. If permanent firestopping cannot be installed within this time period, temporary firestop pillows/blocks are permitted, where installation allows, until permanent firestop materials can be properly installed.

3.2 INSPECTION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until the Contractor, in a manner acceptable to the Architect has corrected unsatisfactory conditions.

B. Verify that environmental conditions are safe and suitable for the installation of the firestop products.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified elsewhere whether or not firestopping is indicated and, if indicated whether such material is designed as insulation, safing, or otherwise.
2. All firestopping shall be installed in accordance to the UL rated system designed for the application.
3. Grout, Mortar or Gypsum based products shall not be installed in lieu of firestopping material specified herein.
4. All smoke walls (smoke barriers, smoke partitions, etc.), rated or non-rated, shall be firestopped with systems designed to maintain a minimum 1 hour rating or that which is equal to the rating of the wall.

B. Penetrations - Provide firestopping as follows:

1. Where penetrations pass through one or both surfaces of a fire rated floor or wall.
2. Where a penetration occurs through fire rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition.
3. Except for slab on grade, where penetrations pass through a non-fire rated floor.
4. The requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening. Upon installation of cabling through sleeve, firestop the remaining open area within the conduit.

C. Where demolition has occurred in rated walls, floors and assemblies, the material used to patch the opening shall match the material used for the assembly construction. Firestopping materials may be utilized upon approval of Architect and Engineer. Materials used shall be provided with submittals. Work performed shall be the responsibility of the Contractor whose work was removed, performed by the appropriate trade.

3.4 PREPARATION

A. Surface to receive firestop shall be free of dirt, dust, grease, oil, oil from release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items.

B. Substrate shall be frost free.

3.5 INSTALLATIONS

A. General

1. Sleeves and core-drilled holes shall be sized at least 1-1/2" larger in diameter than penetrating items.
2. Installation of firestops shall be performed by applicators/installers qualified and trained by the Manufacturer. Installation shall be performed in strict accordance with the Manufacturer's detailed installation procedures.
3. Apply firestops in strict accordance with UL rated system designs, and Manufacturer's recommendations.
4. Coordinate with all other trades to assure that all items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other Construction which would conceal penetrations are not erected prior to the installation of firestop.
5. Gun grade sealants and putties shall be tooled into place to insure proper adhesion to penetrations and surrounding surfaces.
6. Where existing penetrations are reused that contain remnants of existing firestop products remain, remove all existing firestopping.

B. Dam Construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating.
2. Placement of dams shall not interfere with functions or adversely affect the appearance of adjacent construction.

C. Field Quality Control

1. Install work in full accordance with rules, regulations, and safety requirements of Federal, State, County and City authorities having jurisdiction over premises. Do not construe this as relieving Contractor from compliance with any requirements of the Specifications which are in excess of Code requirements and not in conflict therewith.
2. Correct unacceptable firestopping and provide additional inspection to verify compliance with this Specification at no additional cost.
3. Finish surfaces of firestopping that is to remain exposed in the completed work to a uniform and level condition.

3.6 LABELING

A. Where firestopping installations occur, Contractor shall provide a label adjacent to each penetration. Label shall include:

1. UL rated system used.
2. Date of installation.
3. Name of installing Contractor

B. Labels shall be furnished by the firestop manufacturer.

END OF SECTION

SECTION 220700 - PLUMBING INSULATION

GENERAL

1.1 WORK INCLUDES

A. All labor, equipment, accessories, materials and services required to provide the following insulation systems:

1. Pipe Insulation

1.2 SUBMITTALS

A. Refer to Section 220100 and 22 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 QUALITY ASSURANCE

A. The Insulation Contractor shall be regularly engaged in the installation of insulation systems and shall have a minimum of five (5) years of demonstrated experience in the installation of insulation systems similar in type and size.

B. Install insulation materials and accessories in accordance with the manufacturer's published instructions, recognized industry standards and this specification to ensure that it will serve its intended purpose.

PART 2 - PRODUCTS

2.1 GENERAL

A. Insulation material, performance and thickness shall comply with ASHRAE 90.1 - 2010 requirements.

B. Insulation material (insulation, jackets, fitting covers, tapes, adhesives, cements, mastics, sealants, coatings and finishes) shall have a composite Fire and Smoke Hazard rating as tested under procedure ASTM E-84 or UL 723, not exceeding the following:

1. Flame Spread 25
2. Smoke Developed 50

C. Mastics, cements, coatings, adhesives, sealants and finishes shall be suitable for contact with the surface material for which it is applied to and rated for the working temperature of the service. All adhesives and sealants wet applied on site shall comply with chemical content requirements of the South Coastal Air Quality Management District (SCAQMQ) Rule 1168. Acceptable Manufacturers: Foster Products, Childers Products and Vimasco Corporation.

2.2 PIPE INSULATION

A. Insulation Types:

1. Fiberglass: Owens-Corning SSL II-ASJ one piece fiberglass pipe insulation with All Service Jacket and double adhesive longitudinal lap seal. Furnish as a complete system with pressure sensitive butt strip seals having factory applied adhesives. Other acceptable manufacturers: Knauf and Johns Manville.
2. Closed-Cell: Armacell AP/Armaflex Black Lapseal fiber free elastomeric tube insulation. Furnish as a complete system with contact adhesives, pressure-sensitive seam tape, prefabricated fitting covers and pre-insulated pipe hanger supports. For non-EPDM elastomeric insulation located outdoors provide a UV resistant protective coating - Armaflex WB. Other acceptable manufacturers: K-Flex USA and Aeroflex USA, Inc.

B. Fiberglass Insulation Protection

1. PVC Fitting Covers complete with premolded fiberglass inserts with vinyl vapor barrier facing, solvent weld adhesives, stainless steel tack fasteners, silicone caulking and adhesive tapes. Acceptable Manufacturers: Proto Corporation, Speedline Corporation and Zeston.

C. Refer to Pipe Insulation Schedule on Drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Install insulation products according to manufacturer's published instructions, this specification and recognized industry standards to ensure it will serve its intended purpose.

B. Protect insulation stored on site and during delivery from damage and moisture such as rainwater and building system leaks.

C. Ensure that insulation is clean, dry, and in good mechanical condition and that all factory-applied facings are intact and undamaged. Wet, dirty, or damaged insulation is not acceptable for installation

D. Install insulation over clean dry surfaces.

E. Install insulation subsequent to pressure testing and painting.

F. Install insulation materials with smooth and even surfaces. Rework poorly fitted joints. Do not use joint sealer or mastic as filler for joint gaps or excessive voids resulting from poor workmanship.

G. Once in place, all tape shall be sealed with a squeegee type device provided by the Manufacturer.

H. Repair existing pipe and equipment insulation where removed to make new connections or where damaged by new construction. Use same insulation as specified for new service.

I. Where existing asbestos containing materials are discovered or suspected notify the building Owner immediately so they can be removed under a separate "Asbestos Removal Contract" direct with the Owner.

3.2 PIPE INSULATION

A. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.

B. Install insulation continuous through all sleeves and all wall, floor and ceiling penetrations. Sleeves and penetration openings shall be sized accordingly to allow application of full thickness insulation. Coordinate requirements with wall, floor and ceiling construction.

C. On exposed piping, locate insulation and cover seams in least visible locations.

D. Extend all pipe insulation through floors and countertops. Wherever subject to moisture or cleaning equipment provide 0.016 inch thick aluminum jacket of sufficient length for protection.

E. Seal fiberglass pipe insulation longitudinal seams with integral lap seal and butt joints with butt strips. Taper all insulation ends, seal and cover with glass cloth. Insulate valve bodies, fittings, strainer bodies and flanges using premolded fiberglass inserts with PVC Fitting Covers.

F. Seal closed-cell pipe insulation longitudinal seams with integral lap seal and butt joints with seam tape. Apply the manufacturer's recommended adhesive based on the working temperature of service. Insulate all valve bodies, fittings, strainer bodies and flanges using prefabricated fitting covers. Apply two coats of UV resistant protective coating on non-EDPM elastomeric insulation located outdoors.

G. Install insulation continuous through all pipe hanger locations with circumferential insulation joint made outside the hanger. Piping shall be supported in such a manner that the insulation is not compromised by the hanger or the effects of the hanger. Include hanger accessories as follows:

1. Piping 2" and smaller - to protect against compression. Provide insulation protection shields for fiberglass insulation and pre-insulated pipe hanger supports for closed-cell insulation.

H. Do not cover valve bonnets, unions and strainer cleanouts with insulation on hot water systems where there is no possibility of condensation.

I. Insulation system for cold water piping and all piping with a possibility of condensation shall be continuous and provided with a vapor barrier jacket with vapor seal integrity maintained throughout the entire system, including valves and fittings.

1. Longitudinal seams shall be vapor sealed with factory-applied pressure-sensitive adhesive vapor retarder, self-sealing lap. All circumferential joints shall be vapor sealed with factory-furnished, matching pressure-sensitive butt strip seals. Coat all raw edges of pipe insulation with vapor retarder mastic extending onto the adjacent insulation jacketing a minimum of 2 inches.
2. PVC Fitting Covers, installed on fiberglass insulation systems are not vapor barriers. It is important that a separate vapor barrier is intact below and prior to installation of PVC Fitting Covers.
3. Cover valve bonnets, unions and strainer cleanouts with prefabricated 1" thick closed-cell insulation fitting covers, suitable for removal without damaging the permanent adjacent pipe insulation. All insulation shall be form fitted and tight to surface to prevent condensation.

4. Insulate cold water system thermometer and pressure gage extensions with ½" thick closed-cell insulation.

3.3 FIELD QUALITY ASSURANCE

A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be accomplished while work is in progress to assure compliance with requirements to cover and protect insulation materials during installation.

3.4 PROTECTION

A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

B. Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage.

C. The insulation installer shall advise all other trades as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

END OF SECTION

SECTION 221000 - PLUMBING SYSTEM COMPONENTS AND DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Water Supply Specialties

1. Interior Hose Bibbs
2. Exterior Hydrants
3. Water Hammer Arrestors
4. Thermometers
5. Pressure Gauges
6. Vacuum Breakers
7. Backflow Preventers
8. Trap Priming
9. Water Pressure Regulators
10. Water Temperature Regulating Valves
11. Water Filters
12. Expansion Tank

B. Natural Gas Specialties

1. Gas Pressure Regulators

C. Utility Wall Boxes

1. Water and Waste Wall Boxes

D. Drainage Specialties

1. Cleanouts
2. Floor Sinks

1.2 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 WATER SUPPLY SPECIALTIES

A. Interior Hose Bibbs:

1. Manufacturer: Hose Bibbs indicated are Chicago Faucet and Woodford. Other acceptable manufacturers are: T&S Brass and Zurn.
2. Hose Connections: Furnish with garden hose thread outlets conforming to ASME B1.20.7.

3. HB-1: Single temperature supply surface mounted. Brass body with polished chrome finish, 3/4 inch flanged female inlet, 3/4 inch hose thread outlet, removable tee handle, and vacuum breaker. Chicago Faucet No. 952.

B. Exterior Hydrants

1. Manufacturers:

a. Wall hydrants indicated are Jay.R. Smith. Other acceptable manufacturers are: Josam, Murdock, Wade, Woodford and Zurn
b. Hose Connections: Furnish with garden hose thread outlets conforming to ASME B1.20.7.

2. Hydrant Types:

a. Recessed Box Wall Hydrant - Nonfreeze (FPWH-RB): Recessed, stainless steel box, with nickel bronze box face, hinged locking cover, quarter turn hydrant, integral vacuum breaker, tee handle key, 3/4 inch inlet, and hose outlet. Adjustable wall clamp. Valve length to suit wall thickness. "Water" on cover. Jay R. Smith Figure 5509QT.

C. Water Hammer Arrestors

1. Bellows type, with stainless steel casing and bellows, tested and certified in accordance with PDI Standard WH-201. Provide a pressure reducing valve on the inlet to the device where system pressures are above 80psi. Manufacturer: Jay R. Smith. Other acceptable manufacturers are:
Josam, Wade, and Zurn.

D. Thermometers

1. Provide thermometers in piping at following locations:

a. Domestic hot water supply main.
b. Domestic hot water storage tank.
c. Where additionally indicated.

2. Thermometers: Blue color spirit filled glass type industrial thermometer with 9 inch Fahrenheit scale of proper range for service indicated, glass covered case with magnified liquid column, separable well, straight or angle mounted as required.

a. Bi-metal dial type thermometers may be supplied in lieu of spirit filled type.
b. Thermometers located below 6'-0" level: Spirit filled type with 9 inch scale, forward or straight type as required by project conditions. Thermometers serving locations above 6'-0" level to be dial type with remote bulb. Mount 4 inch diameter dials 5'-6" above floor on bracket at appropriate location.

3. Select scale ranges so temperature will fall approximately at mid-scale.
4. Manufacturers: Weiss Instruments, or equivalent by Trerice, Taylor or American.

E. Pressure Gauges

1. Provide a gauge after each water pressure reducing valve. Provide a gauge at the domestic water entry after the backflow preventer. Provide gauges on the suction and discharge of all pumps.
2. Provide gauges having proper ranges as required by conditions. Gauges to have 4-1/2 inch diameter dials, cocks, snubbers, and siphons.
3. Select scale ranges so pressure condition will fall approximately at mid-scale.
4. Manufacturer: Trerice or equivalent by American Consolidated, Marsh or Ashcroft.

F. Vacuum Breakers:

1. Hose Connected Type: Conform to American Society of Sanitary Engineering (ASSE) Standard 1011, with finish to match hose connection. Device must be continuous pressure or non-continuous pressure type depending upon position in the system.

G. Backflow Preventers (BFP):

1. Dual check valve type. Conforming to American Society of Sanitary Engineering (ASSE) Standard 1024. Bronze body, two check modules, stainless steel springs, union and "O" ring seals. Working Pressure 150 PSI. Watts Regulator Co. No. 7 or equivalent by Cla-Val, Conbraco/Apollo, Wilkins, Febco or Hersey.

Backflow Prevention Device Application Schedule	
Equipment served	Device type to be installed
Domestic refrigerator's ice maker	ASSE 1024 dual check BFP

H. Trap Priming

1. Trap Primer (Type EP) electronic - installed in mechanical spaces not above ceilings): Electronically activated UL listed trap primer device complete with NEMA-1 box with cover, circuit breaker, solenoid valve, vacuum breaker, cycle timer with manual override, and distribution unit. Unit requires 115 Volt Power source. Precision Plumbing Products, Inc. Model; PTS 1320 or PTS 2130 for 13 to 30 traps, or acceptable equivalent.

I. Water Pressure Regulators

1. 2 inches and smaller: NSF lead free, bronze body construction, stainless steel integral strainer, renewable stainless steel seat, high temperature resistant diaphragm, threaded or soldered union inlet and threaded outlet. Maximum inlet pressure: 300 PSI. Maximum temperature: 160 degrees F. Adjustable reduced pressure range; 25 to 75 PSI. Watts Series LF25 AUB-Z3 or equivalent by CLA-VAL, Bermad, Fisher, Spence or Wilkins.

J. Water Temperature Regulating Valve (TMV)

1. Thermostatic Valves for Emergency Equipment Use (TMV-E)

a. ASSE 1071 and ANSI Z358.1-2004 compliant. Thermostatic type, bronze body construction with liquid filled thermal motor. Valve components shall be corrosion resistant and replaceable. Valve construction shall employ a stainless steel sliding piston control mechanism.
b. Fail safe operation with positive hot water shut-off upon motor failure or loss of cold water.
c. Valve shall come equipped with union end stop and check inlets with removable stainless steel strainers, and thermometer.
d. Adjustable to deliver water within 3 degrees F of set-point at any temperature between 60 degrees F and 90 degrees F.
e. Manufacturer: Lawler Manufacturing Co., Inc. or equivalent by Acorn, Armstrong, Bradley, Leonard, or Powers.

TMV No.	Lawler Model	Rated GPM	Max Pressure Drop PSI	Inlet Sizes (in)	Outlet Size (in)	Service Duty
ETMV-2	911 E	20	24	1 ¼	1 ¼	One ES, or ESE

K. Water Filters

1. In-Line Point of Use Water Filters

a. Granular activated carbon based in-line point of use type filter with NSF 42 approval.
b. Performance: 2500 gallon service life capacity, 5 micron minimum, 0.5 GPM flowrate,125 PSIG Max, 35˚F Min to 100˚F Max, with 1/4" or 3/8" connections.
c. Filters shall be Omni-pure K5633JJ, or approved equivalent.

L. Expansion Tank:

1. Diaphragm or bladder type, UL, CSA, or NSF listed for potable water use, welded steel shell construction with heavy duty butyl diaphragm and rigid polypropylene liner, 40 degrees F to 240 degrees F operating temperature. Complete with charging valve and tank fittings to make all-gauge, fill, drain, and system connections.

a. 100 PSIG working pressure - non ASME constructed
b. 150 PSI working pressure- ASME constructed.

2. Capacity: As scheduled on drawings.
3. Manufacturer: Amtrol, Inc. Thermo-X-Trol, or equivalent by Bell & Gossett, ELBI, Wilkins, or Wessels.

2.2 NATURAL GAS SPECIALTIES

A. Gas Pressure Regulator:

1. Spring loaded, general purpose, self-operating service regulator which includes an internal relief type diaphragm assembly and vent valve. Diaphragm case can be rotated 360 degrees in rotation to body. Conforms to ASA Code B31.8, for temperatures from -20 degrees F to 160 degrees F. Spring case vent with removable screen. Internal relief for exhaust of excessive outlet pressure out of spring case. Cast iron body, aluminum diaphragm and spring case, nitrile rubber o-rings disk and diaphragm, composition gaskets.
2. Manufacturer: Fisher Controls HSR (3/4" to 1") or CS400/CS800 (1 1/4" to 2") or acceptable equivalent by Maxitrol, or Sensus.

2.3 UTILITY WALL BOXES

A. Wall Boxes:

1. Provide UPC, UL, or CSA listed wall box appropriately configured for applications noted on drawings. All boxes shall be recessed with integral mounting tabs and detachable finish frame. Valves shall comply with ASME A112.18.1.
2. Wall boxes installed in fire rated walls shall be UL listed non-metallic ASTM-E814 fire rated, or constructed of powder coated steel or stainless steel. All non-rated walls may be non-metallic.
3. Furnish wall boxes in the following variations of factory supplied components and configurations.

    a. WB-1: (1) quarter turn supply valve.

4. Manufacturer: IPS/Guy Gray or equivalent by Oatey or Watts.

2.4 DRAINAGE SPECIALTIES

A. Cleanouts and Drains Manufacturers.

1. Cast Iron Roof drains, cleanouts, floor drains/sinks, area drains, and trench drains indicated are Jay R. Smith. Other acceptable manufacturers:

    a. Jonespec
    b. Josam
    c. Wade
    d. Watts Drainage
    e. Zurn
    f. MIFAB

B. Cleanouts:

1. General: All shall be capable of adjustment to match finish surface. Permanently label all cover plates or plugs to match the cleanout service.
2. Floor Cleanouts (CO)

    a. Finished Floors: Jay R. Smith Figure 4025, Duco cast iron body and frame with round adjustable scoriated satin bronze top.
    b. Unfinished Floor and Equipment Rooms: Jay R. Smith Figure 4240, Duco cast iron body and frame with round adjustable scoriated cast iron top.

3. Wall Cleanouts: Jay R. Smith Fig 4422, Duco cast iron caulk ferrule with bronze taper thread plug and stainless steel cover.
4. Cleanouts in base of stacks and interior storm downspouts: Jay R. Smith Fig 4510 series complete with tapped brass plug with stainless steel adjustable cover plate.

    a. Equivalent versions manufactured by the pipe manufacturer specified for service shall also be acceptable.

5. Cleanout Tees: Jay R. Smith Fig 4505 series in hub or no-hub with 1/2 inch tapped test port with raised plug.
6. Cleanouts in suspended sewers shall match the applicable specified piping in section 220300 with cast iron no-hub blind plug or PVC ferrule with PVC screw plug.
7. Outside cleanouts occurring in paved, slag or cinder areas: Jay R. Smith Series No. 4250 set in a concrete collar flush with grade.

    a. Install outside cleanouts occurring in other areas with a vitreous stopper flush with finished grade.

C. Floor Sinks:

1. FS-2: Cast iron body with inside caulk or no-hub bottom (4 inch or less) outlet, flat bottom strainer, seepage flange, nominal dimensions: 12 inch square, 6 inch depth, with heavy duty ductile iron grate. Jay R. Smith 2632.

    a. Grate Applications:

        1) Full Grate: traffic locations
        2) Less Grate: receiving (3) or more indirect wastes and non-traffic locations.
        3) Half Grate: receiving (2) or less indirect wastes and non-traffic locations.

PART 3 - EXECUTION

3.1 GENERAL

A. Refer to section 220300 part 3 Execution in addition to the following.

B. Drawings (floor plans, schematics, and diagrams) indicate the general location and arrangement of equipment. Location and arrangement of equipment takes into consideration pipe connections locations, panel clearance, replacement and service access, and other design considerations. So far as practical, install equipment as indicated or request deviations with supportive reasoning to the Engineer of record.

3.2 INSTALLATION

A. Provide all drains installed in waterproof slabs with a flashing ring and coordinate elevation with general trades.

B. Install all components per the manufacturer's recommendations and requirements.

END OF SECTION

SECTION 221323 - OIL INTERCEPTOR - CONCRETE

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Oil Interceptor - Concrete

1.2 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 OIL INTERCEPTOR - CONCRETE

A. General: Designed to meet applicable sections of the latest editions of the Uniform Plumbing Code or the International Plumbing Code to separate oil from the wastewater.

B. Construction: Reinforced precast concrete construction with a compressive strength of 5000 PSI at 28 days. Furnish with inlet baffle. Outlet piping schedule 40 PVC with riser tee and clean out to grade. Furnish with 18 inch diameter manhole riser with cast iron cover located over inlet. Furnish concrete plug over outlet. Tank construction sealed water tight with concrete sealant CS-101 mastic.

C. Designed to be heavy duty traffic bearing constructed with a nominal wall thickness of 6 inches.

D. The Oil Separator shall be of capacity and similar dimensions as indicated in the schedule on the contract drawings.

E. Manufacturer: Mack Industries, Inc. or acceptable equivalent by Lindsay Concrete Products, E.C. Babbert, or O.C. Adams.

PART 3 - EXECUTION

3.1 GENERAL

A. Refer to section 220300 part 3 Execution in addition to the following.

3.2 DELIVERY, STORAGE AND HANDLING

A. Contractor shall be responsible for equipment delivery to site, off-loading, un-crating, and protection of its integrity up to, and through its installation. Any and all damage shall be repaired to the condition of new, or replacement.

3.3 INSTALLATION

A. Drawings indicate the general location and orientation of the interceptor and takes into consideration servicing and access. Field position the unit to meet actual site and invert requirements. Provide riser rings as need to finished grade.

B. Any and all of the manufacturer's installation requirements shall be followed.

C. For underground installations, take all precautions during installation for prevention of buoyancy and the timing of excavation backfill. Prime tanks(s) with water upon completion with water as needed.

D. For exterior to building installations, provide green warning tapes directly above ten linear feet of inlet and outlet piping as well as the outside edges of an underground interceptor.

END OF SECTION

SECTION 223415 - DOMESTIC WATER HEATER - GAS FIRED, STORAGE TYPE - CONDENSING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Domestic Water Heater.

B. Coordination with other divisions

1.2 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER HEATER - GAS FIRED, STORAGE TYPE - CONDENSING

A. Provide a NAECA and ASHRAE 90.1b compliant and CSA design certified water heating equipment. Tanks shall be certified at 300 PSI test pressure and 150 PSI working pressure.

B. Capacity: gas input, tank storage, and recovery capacity shall be as scheduled on the drawings.

C. General: Internally glass lined steel tank with integral sediment reduction technology. Tank shall be non-CFC foam insulated and with a baked enamel finished jacket. Unit shall be complete with magnesium anode rods, brass drain valve, dielectric water way connections, tanks with access openings for inspection and cleaning, integral control system adjustable to a maximum of 180° F, and ASME temperature & pressure relief valve.

D. Burner: pre-mix power burner with submerged combustion chamber, spiral heat exchanger or multi-pass flue design withstanding thermal shock, glass lined or stainless steel flue base withstanding acidic condensate, [low NOx emissions], and 96% minimum rated efficiency. Unit complete with condensate drain neutralization, thermal cut-out capability, electronic ignition, and flame sight glass.

E. Venting: capable of direct vertical or side wall venting and combustion air intake with non-metallic piping per manufacturer.

F. ASME construction shall be required on all heaters of 120 gallons storage or greater and for all heaters of 200,000 BTUH input or greater.

G. Minimum Warranty: 3 year tank against scale caused failure, 1 year against component failures.

H. Acceptable Manufacturers:

1. A.O. Smith: Cyclone Series
2. Bock: OptiTherm

3. Bradford White: EF Series
4. Lochinvar: Shield
5. Rheem: Triton Series
6. State: Ultra-Force

PART 3 - EXECUTION

3.1 GENERAL

A. Refer to section 220300 part 3 Execution in addition to the following.

3.2 DELIVERY, STORAGE AND HANDLING

A. Contractor shall be responsible for equipment delivery to site, off-loading, un-crating, and protection of its integrity up to, and through its installation. Any and all damage shall be repaired to the condition of new, or replacement.

3.3 INSTALLATION

A. Drawings indicate the general location and orientation of the equipment and takes into consideration logistical replacement, servicing, and operational access. Minor field re-positioning shall not alter the functionality of such.

B. Any and all of the manufacturer's installation requirements shall be followed.

C. Maintain front access to all control panels in compliance to the National Electrical Code clearances.

3.4 CONNECTIONS TO EQUIPMENT FURNISHED OR SUPPLIED BY OTHERS

A. Coordinate with divisions 23 and 26 as required.

3.5 FLUE AND COMBUSTION AIR PROVISION

A. Division 22 shall assure that all manufacturer's installation and material requirements for flue venting, condensate neutralization, and combustion air ducting/piping are compliant.

1. Installation of such shall be by division 23. If no division 23 contractor exists on the project, installation shall be by division 22.
2. When manufacturer's requirements allow for non-metallic piping, only CPVC solvent welded systems or UL listed Polypropylene Flue Systems with mechanical/push joining shall be acceptable. The use of PVC pipe and fittings is prohibited regardless of manufacturer's acceptance.

3.6 STARTUPS

A. Provide start-up by a qualified factory trained technician / representative.

END OF SECTION

SECTION 224000 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Plumbing Fixtures

B. Faucets

C. Fixture Trim and Accessories

D. Fixture Carriers and Supports

E. Fixture Supplies, Drain Assemblies, and Traps

F. Fixture Operation

G. ADA Compliant Installations

H. Water Supply Temperature

I. Protective Wraps

J. Sealants

K. Coordination With Other Trades

1.2 SUBMITTALS

A. Refer to Sections 22 01 00 and 22 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. Group all components of individual fixtures to corresponding tags indicated on Contract Drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Refer to the Plumbing Fixture Schedules on the Drawings. The scheduled fixtures indicate the basis of design and their configuration with manufactures and model numbers for each fixture, fitting, and accessory. The remainder of this section shall further cover the general requirements for typical fixture types and installations, and do not contradict the schedule.

B. All fixtures and their components furnished by this contractor shall bear the identification of the manufacturer with such markings and be listed by an approved third party agency complying with applicable referenced standards such as but not limited to: IAPMO ANSI, ASME, UPC, and NSF.

C. Provide all plumbing fixtures complete, cleaned, adjusted, and ready for use including, but not limited to supply stop-valves, check-stops, fixture supplies, traps, escutcheons, vacuum breakers, miscellaneous supports, low voltage wiring and any required accessories.

D. All supply stops, supply tubing, covers/wraps, tubular traps and wastes shall be consistent throughout the project. Multiple styles and brands of such commodity items are not acceptable.

E. Refer to Architectural elevations for intended placement of fixtures and their components provided under this division and components provided by other divisions that affect the installation and use of the fixture. Install all components within required ADA dimensions mandated by the applicable State observed code referenced ANSI 117.A along with manufacturer's rough-in dimensions necessary to its function. In the event of a conflict with said requirements of fixtures and components verse the Architectural elevations, notify the construction managing party, or design team prior to rough-in for clarification and resolution. The locations of piping and or drops shown on the plumbing drawings are diagrammatic, not precise, nor defining of actual rough-in or fixture placement.

F. Fixture Finishes

1. Provide fixtures constructed of vitreous china white in color unless noted otherwise, and with all visible surfaces glazed.
2. Furnish enameled cast iron fixtures constructed of cast iron with non-staining, acid resistant, porcelain enameled coat thoroughly fused on the surfaces.
3. Furnish stainless steel sinks with satin finish, unless noted otherwise.
4. Provide exposed faucets, traps, connecting piping, stops, flush valves and other fixture trim with chromium plated finish and brass construction unless noted otherwise.
5. Provide all fasteners of chromium plated brass, Type 302 stainless steel or matching color and finish of fixture.

G. ADA Protective Covers

1. ANSI A177-1-1980 Vinyl or compliant insulation kit. Closed cell PVC molded anti-microbial components for wastes and supplies of lavatories complete with weep holes and vandal resistant fastening.
2. Manufacturer: Plumberex, or equivalent kits by Dearborn, McGuire or Truebro.

H. Sealant: For use between plumbing fixture and wall: General Electric Sanitary Silicone 1702.

1. Provide pick-proof caulk in Penal, Security, and Behavior Health applications. Refer to general trades specifications for product data.

I. Fixture P-Trap wastes: P-traps shall be chrome plated heavy cast brass with cleanout and 17 - gauge seamless brass adjustable wall bend. To include cast brass, slip joint nuts and no reducing washers. P-Trap to have 2"" water seal and rough-in complete. P-Trap shall be certified by CSA or other recognized third-party testing authority and marked with manufacturer''s name. No private label wholesale products will be allowed.

J. Fixture Grid Drains: grid drains shall be chrome plated cast brass strainer (with or without overflow) and brass lock nut. Drain tailpiece shall be 17-gauge seamless brass tube and a minimum of 6"" long. Grid drain shall be certified by CSA or other recognized independent third-party testing authority, and shall be marked with manufacturers'' name. No private label wholesale products will be allowed.

K. Fixture Supplies: supply kits shall include chrome plated all brass stops with brass stems, no plastic stems. Kits shall have 12" chrome plated copper risers and cast brass flange with set screw. Inlet shall be ½" IPS connection and outlet shall be 3/8" compression. All washers shall be EPDM material Peroxide cured. Supply kit shall be certified by recognized independent third-party testing authority, will be marked with the manufacturer's name and comply with the SDWA (Safe Drinking Water Act) "No Lead" restrictions of ANSI NSF 61, Sec. 9. No private label wholesale products will be allowed.

1. Supplies serving fixtures called for having an ASSE 1070 thermostatic mixing valve, provide supply stops with integral check valve.

2.2 ACCEPTABLE MANUFACTURERS

A. Stainless Steel Sinks

1. Just
2. Elkay
3. American Standard
4. Moen Commercial

B. Faucets

1. Chicago Faucet
2. T & S Brass
3. Zurn

C. Fixture Supplies, Drain Assemblies, and Traps

1. Chicago
2. EBC
3. Watts (commercial only)
4. Brass Craft
5. Dearborn Brass
6. McQuire Manufacturing
7. T & S Brass
8. Just
9. Elkay
10. Kohler
11. Zurn

D. Emergency Shower/Eyewash Station

1. Acorn
2. Bradley Corp.

3. Chicago Faucet
4. Encon Safety Products
5. Haws.
6. Guardian Equipment

2.3 SINKS

A. Fixtures: 18 gauge min. type 304 stainless steel with sound deadening undercoating and radius corners, in configurations of wall-hung, floor mounted, countertop drop-in, under mount, or integral countertop material by another division.

B. Faucets: Commercial grade lead free brass construction with chrome plated finish. Deck or wall-mounted, auto-sensing or manual operation with fixed or swivel spout. Furnish complete with all suitable mounting hardware and components. All faucets shall have a vandal resistant removable laminar flow outlet, aerator, or spray-head at the outlet or the spout.

1. Manual operated faucets shall have vandal resistant removable handles and replaceable cartridges or ceramic discs.

C. Supplies: Chrome plated field bent tubing supplies with loose key or handle quarter-turn ball valve stops, reducers, and escutcheons at wall or casework backing.

D. Sink drains: Stainless steel with chrome plated flat grid strainer(s) (7) hole minimum, or removable crumb cup strainer(s). Sinks to have 1-1/2" tailpiece(s). Tailpiece to be equipped with residential dishwasher drain provision where indicated on plans. Strainer assembly not required for sink compartments where garbage disposals are to be installed. Commercial three compartment ware washing sinks to have flat grid strainers with 2" lever stopper tailpieces.

E. Traps: Provide 17 gauge chrome plated brass tubular waste piping with adjustable "P" trap with cleanout. Provide escutcheon at wall or casework backing. Non threaded slip type gasket trap adapters shall not be acceptable.

2.4 EMERGENCY SHOWER/EYEWASH STATION

A. Fixture: ANSI Z358.1 compliant combination shower/eyewash safety station. Floor supported pre-piped unit to include a ten inch diameter 30 GPM deluge shower head with 1 inch IPS stay open brass ball valve, pipe supported eyewash basin, dual eye wash spray heads with dust covers, ½ inch chrome plated stay open ball valve, 1-1/4 inch drain, and factory furnished ANSI compliant signage. Activation of shower by a stainless steel triangular pull rod. Activation of eyewash by a push paddle. All exposed components to be stainless steel, galvanized steel, ABS, or with coating as scheduled.

B. Supply: Tepid water connection with 1-1/4 inch NPT female inlet.

C. Drain: 1-1/4 inch NPT female outlet tee at 8 inches above the floor. Provide 1-1/4 inch galvanized steel piped drain to safewaste to nearby floor drain. Non threaded slip type gasket trap adapters shall not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Architectural Drawings for indication of mounting heights for plumbing fixtures.

B. Install all fixtures square with wall, inline, level, and plumb. Install faucet lever and wrist blade type handles also parallel with the wall and completely symmetrical. Install specified convertible faucet spouts in the rigid fashion for lavatories and hand washing sinks, install them in the swing fashion for all large sinks in lounges and utility cleaning rooms and at double compartment sinks.

C. Fixture Carriers: Install and anchor in according to the manufacturer's published instructions.

D. Fixture carriers: To comply with the ASME A112.6.1M standard, the installing contractor shall install and anchor all fixtures explicitly per the manufacturer's instructions including all specified hardware. Compliance to size, material, and quantity of fasteners as prescribed by the manufacturer shall be the responsibility of the installing contractor. Provide and submit documentation and sign-off approval of the installation from the construction manager prior to concealing behind walls. Failure of any fixture without submitted documentation shall be the responsibility of the plumbing contractor including all wall repairs.

E. Secure plumbing fixture P-traps, lavatory wall supplies and flush valve supply to wall to prevent any movement.

F. Install all exposed plumbing trim, supplies, and waste, including traps.

G. Install shut off valves for each hot and cold water connection to fixtures and equipment if not provided with stops. Use angle or straight type fixture stops adapted for each particular location. Locate fixture stops immediately adjacent to the fixture. Provide threaded adapters when used in conjunction with copper piping.

H. Each emergency safety fixture shall have independent shut-off capability and not be shared with other nearby fixtures, double supply stops are not permitted. Tepid water supply serving emergency fixtures shall be provided by an ASSE 1071 mixing valve as per section 221000.

I. Seal space between plumbing fixtures and wall or floor with silicone sealant to provide watertight installation.

J. Clean all fixtures removing stains. Remove labels. Adjust flush valves and other fixture water supplies to provide proper water flow.

K. Protect plumbing fixtures after installation until construction is completed and accepted by Owner. Remove protection, including paper covering on china and enameled ware, when ready for use.

L. For solid surface countertops requiring basins, faucets, and equipment to be installed, the plumbing contractor shall provide templates, locations, and dimensions of all required cut-outs and drilled holes. The cutting and drilling of solid surface material countertops shall be performed by the general contractor that is responsible for installing such. For laminate type countertops, the plumbing contractor shall be responsible for all cut-out and drilling required.

END OF SECTION

SECTION 230100 - HVAC GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to this Division's Supplemental General Provisions for additional Project requirements.

B. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates and Addenda are a part of this Specification. Contractors and Subcontractors shall examine these provisions as they may affect work under this Division.

C. Contractor shall examine Division 1 Contract Documents for general project requirements.

D. Contractor shall also examine the Contract Documents of all Divisions which may affect and require work under this Division and be responsible for all work required under this Division.

1.2 DESCRIPTION OF WORK

A. This project involves work in an existing operating facility and will require close communication with Owner with regard to access and work hours. Coordinate all work schedules prior to bidding with Owner. When project includes a Construction Manager, all work schedules shall also be coordinated with the Construction Manager, prior to bidding.

B. All Drawings as well as the Specifications for all Divisions shall be defined as the Contract Documents. Contractor shall review entire set of Contract Documents prior to bidding.

C. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both the Specifications and the Drawings.

D. Prior to submitting bid, Contractor shall examine all Drawings and Specifications to develop a complete understanding of the project scope. Contractor shall ask for clarifications during the pre-bid phase of the project. Failure to do so will not relieve the Contractor of their responsibility to perform all required work.

E. Where the project scope involves renovations and additions, it is required that Contractors visit the site of the work and become familiar with the conditions affecting the installation. Submission of a Bid shall presuppose knowledge of such conditions and no additional compensation shall be allowed where extra labor or materials are required because of the lack of knowledge of these conditions.

F. Bid shall include any special phasing requirements related to the construction work as described in the Contract Documents. Coordinate with Division 1.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation shall be considered applicable. In the event that such interferences occur in course of the work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences that may occur during the course of construction shall be brought to the immediate attention of the Architect and Engineer, and the Architect and Engineer's decision, confirmed in writing, shall be final.

H. The following general terms as used within the context of the Contract Documents shall be defined as follows:

1. "Contract Documents" - The complete set of Drawings and Specifications for all Divisions included in the project.
2. "Drawings" - Drawings furnished as part of the Contract Documents.
3. "Contractor" - This Division's Contractor and the Subcontractors to this Division's Contractor.
4. "Responsible" - To perform work required.
5. "Furnish" - To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" - Work which includes the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" - To furnish and install, complete and ready for the intended use.
8. "Equal" - To meet or exceed the standards of the specified products or listed manufacturers.
9. "Mechanical" - HVAC, Plumbing and Fire Protection Divisions as applicable.

1.3 WORK INCLUDES

A. Include all labor, material, equipment, services, coordination, supervision and administration necessary for the proper completion of all work shown. Items omitted, but necessary, to make all systems complete and workable shall be understood to form part of the work.

B. Material for work required to complete installation such as earthwork, concrete, masonry, mortar, reinforcing steel, patching and painting shall be provided as specified in other applicable Divisions covering such work.

C. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Include all testing, test reports, system programming, start-up reports and warranties for each system as outlined elsewhere in these Specifications. Refer to "Operating and Maintenance Manuals" for additional requirements.

1.4 ALTERNATES

A. Refer to this Division's Supplemental General Provisions for a description of alternates.

1.5 PERMITS AND FEES

A. Secure and pay for permits and inspections required for all work related to this Division. Turn over certificates of approval to the Owner or Construction Manager promptly when received, and before payment is made for the work.

B. Give proper authorities notice as required by law relative to the work in their charge. Comply with the regulations regarding temporary enclosures, obstructions or excavations and pay all legal fees involved.

1.6 QUALITY ASSURANCE

A. Work shall be installed in accordance with provisions of all applicable codes, as interpreted by the local Authority Having Jurisdiction (AHJ), as well as any further modifications or regulations published by local or State Authorities.

B. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

C. The following building codes with amendments shall be followed:

1. Ohio Building Code
2. Ohio Fire Code

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Testing and Material (ASTM)
3. Americans with Disabilities Act (ADA) - Americans with Disabilities Act Accessibility Guidelines (ADAAG)
4. Federal Occupational Safety and Health Act (OSHA)
5. NFPA Standards as referenced by the Building Codes.
6. Authority having jurisdiction

1.7 ELECTRONIC MEDIA

A. Electronic drawing files are available to the Contractor from the Engineer for coordination purposes as defined in Division 0 and Division 1.

B. Contractor shall deliver closeout documents on a portable memory device. Portable memory device shall refer to CD, DVD, Flash Drive, external hard drive or any other portable media used for storing electronic files.

1.8 SUBMITTALS

A. Conform to submittal requirements outlined in Division 1 Specifications. Provide Submittals in an electronic format. The file format shall be portable data file (.pdf).

B. Submittal transmittal shall list corresponding Specification Section and a description of item(s) being submitted. Each submittal shall only include items from one Specification Section. Submittals which include items from multiple specification sections will be returned "REVISE AND RESUBMIT."

C. Prepare Submittals with adequate details and dimensions as necessary to clearly show construction. Clearly identify each item on the submittal with designation as indicated on Drawings including location and use. Include with Submittals Manufacturers published descriptive literature, specifications, performance data (normal operating characteristics, curves, ratings, etc.), wiring diagrams and installation instructions. Indicate for each item the operating characteristics, design conditions, features, and optional items that are intended for application on this project. Where contents of Submittal literature include data not pertinent to the Submittal, clearly indicate (highlight) which portion of content is being submitted for review.

D. Contract Documents include scheduled equipment which is the Basis of Design and used to establish design and space requirements. Contract Documents may also include alternative acceptable manufacturers. Where alternative manufacturer's equipment is submitted which alters the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with deviations from the Basis of Design shall be borne by the Owner.

E. If for any reason, the Submittal shows variations from the requirements of the Contract Documents, the Contractor shall make mention of such variation in the letter of transmittal. The Contractor shall note in red on the Submittal any change in design or dimension on the items submitted including changes made by the Manufacturer which may differ from catalog information.

F. Where additional installation drawings, wiring diagrams or other drawings are specified elsewhere as part of the project requirements, they shall be submitted at the same time as the Submittals. Partial Submittals are not acceptable.

G. Contractor shall review each Submittal prior to submission, and check for compliance with the Contract Documents. Corrections shall be noted. Mark with approval stamp prior to submission. Submittals that do not bear the Contractor's approval stamp will be returned without action.

H. The Submittals will be reviewed only for General compliance and not for dimensions, quantities, etc. The responsibility of correct procurement remains solely with the Contractor. The Submittal review shall not relieve the Contractor of responsibility for errors or omissions and deviations from the Contract Document requirements. Submittals which are not required under this Division shall be returned to the Contractor.

I. Where Submittal review format, whether hard copy or software based, includes pre-determined language that includes the word "Approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" or similar verbiage shall be defined as "Reviewed, Exceptions as Noted".

J. After review of submittals by the Engineer, the Contractor shall revise and resubmit if required to establish compliance with the Contract Document requirements. Resubmittal shall include a document with a written response to each of the Engineer's previous comments.

K. The Contractor shall notify the Engineer when all product data and/or shop drawings for all equipment, materials and systems have been submitted for review.

L. The Contractor agrees that Submittals, processed by the Engineer, are not change orders; that the purpose of submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design intent of the project. This understanding is demonstrated by indicating which equipment and material is required, and by what methods of fabrication and installation will be utilized.

M. The Contractor further agrees that if deviations, discrepancies or conflicts between the Submittals and the Contract Documents are discovered, either prior to or after Submittals are processed by the Engineer, the Drawings and Specifications shall control and shall be followed.

N. Final reviewed submittals shall be included in the Operating and Maintenance Manuals. Where Submittals are returned "REVIEWED, EXCEPTIONS AS NOTED", the final Submittals shall be updated to include the exceptions. Upon ordering equipment, order sufficient number of sets of product data literature for the Operating and Maintenance Manuals.

1.9 GUARANTEE AND WARRANTIES

A. Warrant that equipment and all work is installed in accordance with good workmanship practice. All equipment shall be installed in accordance with the Manufacturer's recommendations and shall meet the requirements specified. Any equipment failing to perform or function as specified shall be replaced with complying equipment without cost to the Owner. Warranty shall commence upon acceptance of substantial completion of construction by the Owner. Sign-off of individual equipment start-up procedures shall not activate the warranty commencement.

B. Guarantee against defects in workmanship and materials; repair or replace any defective work, material or equipment within one year from date of formal written warranty commencement. Longer product warranties provided by individual equipment manufacturers shall supersede this one year guarantee; however, the Contractor shall maintain the one year workmanship and materials guarantee for installation of such equipment. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall consist of marked-up Drawings as defined elsewhere in the Specifications. Refer to Division 1 for quantities, special formatting, and additional requirements.

2. The Contractor shall keep one complete set of the original Drawings on the project site on which shall be recorded any deviations or changes from such Drawings made during construction. These drawings shall become the Record Drawings, shall be kept clean and undamaged, and shall not be used for any other purpose other than recording deviations from the original Drawings. At the end of the project, the Contractor shall make electronic .pdfs of these drawings and transfer them onto a portable memory device. Both hard copy drawings and the portable memory device shall be provided as Record Drawings.
3. After the project is completed, the Record Drawings shall be delivered to the Architect/Engineer for inclusion into the Operating and Maintenance Manuals, as a permanent record of the installation as constructed.

1.11 SITE REPORTS AND PUNCHLISTS

A. The Engineer may visit the site periodically during construction and provide written Construction Observation Reports to the Contractor identifying areas where installation does not meet the intent of the Contract Documents. The Contractor shall provide a written response to these reports within 5 business days, indicating the reason the installation is out of compliance with the Contract Documents. After review, the Engineer may or may not require the Contractor to correct the installation. The Contractor shall correct the installation unless the reason for non-compliance is accepted, in writing, by the Engineer or Owner.

B. Final Punch List

1. The Engineer will visit the site to perform a scheduled Final Punch List to identify areas where the installation is incomplete or does not meet the intent of the Contract Documents.
2. If the Engineer is requested to perform the Final Punch List prior to the Contractor being 100% complete with their scope of work, the Contractor shall furnish a Contractor's Completion List, indicating all incomplete work. This list shall be furnished to the Engineer a minimum of 24 hours prior to the scheduled Final Punch List.
3. The Contractor shall respond to each punch list item along with a date, indicating that the item has been completed or corrected.
4. A copy of the Final Punch List with the Contractor's responses shall be included on the Operating and Maintenance Manual.

C. Where on-line documentation management services or project management software requires the author/initiator of a corrective action to close it, and the Engineer is the author/initiator, the following shall apply:

1. When the corrective action is reported as corrected/complete, by either the responsible Contractor or the Construction Manager, the Engineer will assume that the parties responsible for construction have reviewed and approved the correction.
2. By closing the corrective action, the Engineer is in no way approving nor assuming responsibility for the installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials used on this project shall be new and listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, etc.or as approved by the local Authority Having Jurisdiction. Equipment and materials shall be installed or used in accordance with instructions included with the listing or labeling. Where possible, the same brand or manufacturer shall be used for each type of material or equipment. such as.

B. Equipment and materials for the construction shall be the responsibility of the Contractor and shall be protected by the Contractor until formally accepted by the Owner.

C. All Manufacturers of equipment shall verify to the satisfaction of the Contractor and Engineer that their equipment will function properly under the conditions of use, as shown on the Drawings and as specified herein. Dimensions, weights, operating characteristics and all other related appurtenances shall be verified before submittal of shop drawings.

2.2 MATERIAL SUBSTITUTIONS

A. Bids shall be based upon the specified products, suppliers or listed alternatives. The Drawings and Specifications are based on the products specified by type, model, size and suppliers if indicated and thus establish minimum qualities which substitutes must meet to qualify for review.

B. Should the Contractor propose to furnish materials, equipment and/or suppliers other than those specified, submit a written request for substitutions to the Architect or Engineer in accordance with Division 1 requirements. The request shall be an alternate to the original Bid and shall be accompanied with complete descriptive (manufacturer, brand name, catalog number, supplier name and references, etc.) and technical data for all items. Indicate any additions or deductions to the base Bid price.

C. Where substitutions alter the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with the use of a substitution shall be borne by the Owner.

D. Acceptance or rejection of the proposed substitutions shall be subject to approval of the Architect or Engineer. If requested, the Contractor shall submit inspection samples of both the specified and the proposed substitute items for review.

E. In all cases where substitutions are permitted, the Contractor shall bear any and all extra cost of evaluating the equality of the material and equipment to be installed.

F. Where only one Manufacturer or supplier is named in the Contract Documents, the system or equipment shall be provided as specified.

G. Verbal requests or approvals of substitutions shall not be binding on the Architect, Engineer or Owner.

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall follow all safety requirements as defined herein, as described in Division 1 and as defined by Owner safety protocols.

B. Work shall be performed on de-energized equipment in accordance with NFPA 70E.

C. Should suspected hazardous materials be encountered, Contractor shall adhere to procedures, methods and regulations of the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) and immediately notify Owner.

3.2 COORDINATION

A. Take all field measurements necessary and assume responsibility for the accuracy.

B. If any work is fabricated or assembled off-site, assume responsibility for the accuracy of such pre-manufactured assemblies.

C. Install work that is to be concealed within the building construction in sufficient time to secure proper location without delay to the work of other trades.

D. Assume responsibility for location of chases, other openings through masonry and concrete construction. When work cannot be installed concurrent with building construction, arrange for rough-in boxes, sleeves, inserts and other items, as necessary for installation thereof at a later date.

E. If any work is installed so that the architectural design cannot be adhered to, Contractor is responsible for making such changes as Architect may require. Before installing work, report any interferences between work of this Division and work of other Divisions to Architect as soon as discovered. Architect will determine which work must be relocated, or make adjustments to maintain clearances, maximum headroom and to avoid conflict with other work.

F. Become familiar with the construction where work attaches. Review Structural Drawings for coordination of openings. Cut no structural members or slabs without Architect's and/or Structural Engineer's written approval.

G. Exercise caution when working in areas where concealed systems or materials may exist. Any costs for repair of damage incurred shall be the responsibility of Contractor causing the damage.

3.3 PROTECTION

A. All finished surfaces shall be protected from damage and spills during construction.

1. Protect finished floors with a heavy duty flexible fiber reinforced floor protection board - Ram Board or equal.
2. When setting up pipe cutting and threading machines, protect area against staining and abrasion. Provide plywood protection over Ram Board underlayment.
3. Protect finished surfaces from chips and cutting oil by use of a chip receiving pan and oil proof cover.

4. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
5. Protect finished surfaces from paint droppings, insulation adhesive, etc. by use of drop cloths.

B. The Contractor shall provide protection for any roof areas that will be affected by this scope of work. The roof protection shall be positioned such that it provides protection from falling objects such as tools and materials.

C. The cost of correcting any such condition will be charged against the respective Contractor.

3.4 EQUIPMENT INSTALLATION

A. Install equipment in accordance with equipment manufacturer's published installation instructions.

B. Should the Drawings and/or Specifications include procedures that exceed or call for materials that differ from the manufacturer's instructions, the Contractor shall follow the Drawings and/or Specifications. This requirement does not release the Contractor from the obligation to follow all other published instructions and installation recommendations. Contractor shall make Engineer aware, in writing, of discrepancies between the Drawings and Specifications and the manufacturer's published installation instructions, and/or confirm Engineer's design intent, prior to installation of the equipment. Failure to comply may result in reworking the equipment installation or replacement of materials associated with the equipment at no additional cost to the Owner.

3.5 CUTTING AND PATCHING

A. All cutting and patching in construction as necessary for installation of this work shall be the responsibility of this Division and performed by the Tradesmen related to that specific Division of work. Subcontract this work to the appropriate Trade Division.

B. Do not cut any structural member, including but not limited to steel framing and structural floors, without specific permission from the Architect and/or Structural Engineer.

C. Do not cut openings in roof or floor construction without specific permission from the Architect and/or Structural Engineer. Existing roof warranty must be maintained.

D. Where locations of penetrations are inaccurate or where building components are improperly cut by inadequate methods, the Contractor in error shall be responsible for complete repair.

E. The Contractor shall assume responsibility for removing and replacing existing ceiling tiles as required for installation of all work. Areas include that as outlined by the project scope and areas outside the scope where the Contractor is required to make connections to existing systems and install new work. Damaged tiles shall be replaced.

3.6 SERVICE SHUTDOWNS

A. This project involves remodeling of existing areas in an operating facility. Plan work including alterations and connections to existing facilities, to permit carrying on normal building functions. When necessary to temporarily interrupt a service, shutdowns shall be scheduled through the Owner and shall be done at a time as directed by the Owner. No additional compensation shall be allowed for these shutdown periods even though premium time work may be required unless specifically defined in Division 1.

B. Provide temporary service to equipment or systems that cannot be shut down, and as determined by Owner, or as described in the Contract Documents. Remove temporary services when permanent work is completed

C. Provide a minimum of one week notice to the Owner before any service shutdown is scheduled.

3.7 INDOOR AIR QUALITY

A. All occupied areas of building shall remain free from odors, fumes, dust and smoke generated from installation of material and equipment.

B. Arrange with the Owner to schedule isolation of areas where paints, adhesives, solvents, etc., will be used. Areas shall remain isolated until all materials have cured sufficiently as to stop out-gassing of fumes or odors and area has been ventilated to remove all detectable traces of odors and fumes.

C. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas.

END OF SECTION

SECTION 230101 - HVAC SUPPLEMENTAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to 23 01 00: HVAC General Provisions for additional Project requirements.

1.2 ALTERNATES

A. Include Alternates as outlined in Division 1 added to or deducted from the Base Bid Price. HVAC Alternates shall be as follows:

1. Alternate H-1 shall be added to the Base Bid Price, and shall include the replacement of the existing burners and vacuum pumps on the gas-fired radiant heating system serving the garage space. Price shall include all work required for the removal of existing burners and pumps and the furnish and install of new burners and pumps, including electrical, gas piping, ductwork, etc. New equipment shall be a one-to-one replacement of the same make and model.

1.3 QUALITY ASSURANCE

A. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

B. The following building codes with amendments shall be followed:

1. 2017 Ohio Mechanical Code
2. 2017 Ohio Plumbing Code
3. 2015 International Fuel Gas Code

C. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
2. ASHRAE 90.1-2010: Energy Standard for Buildings
3. American Society of Mechanical Engineers (ASME)
4. American Welding Society (AWS)
5. National Fire Protection Association (NFPA)
6. NFPA 70-2017: National Electric Code
7. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

D. All Contractor personnel who perform installation, maintenance or repair work who might have the opportunity to release CFC's, HCFC's, or HFC's into the atmosphere shall have a UNIVERSAL certification as required by Environmental Protection Agency, Section 608 Regulatory Requirements: Stationary Refrigeration and Air Conditioning.

1.4 SUBMITTALS

A. Prior to commencing work, submit product data and/or shop drawings for HVAC equipment, materials and systems as required in each individual Division 23 Specification section. Provide all Submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.

1.5 CONSTRUCTION DOCUMENTATION

A. Testing, Adjusting and Balancing Report

1. Submit Testing, Adjusting and Balancing Report to Engineer upon completion.
2. Refer to Section 23 03 00 for additional information.
3. Final copy shall be included in Operating and Maintenance Manuals.

B. Ductwork Pressure Tests

1. Submit ductwork pressure testing documentation to Engineer upon completion of testing.
2. Refer to Section 233000 for additional information.
3. Final copies shall be included in Operating and Maintenance Manuals.

1.6 GUARANTEE AND WARRANTIES

A. Guarantee air conditioning equipment refrigeration compressors for five years.

1.7 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall reflect as-built conditions and show changes in:

   a. Size, type, capacity, etc. of any material, device or piece of equipment
   b. Location of any device or piece of equipment
   c. Location of any outlet or source in building service system.
   d. Routing of any piping, conduit, ducts or other building services.

2. Record Drawings shall indicate the location of all underground, under floor and concealed piping.
3. Record Drawings shall indicate rated walls where firestop materials have been applied.
4. Record Drawings shall indicate the location of all tagged valves including the tag designations.

B. Operating and Maintenance Manual (OMM)

1. Once submittals are completed, provide an OMM index to the Engineer for review. Once index is approved, submit an electronic copy of the OMM to the Engineer for acceptance.
2. Furnish electronic Portable Document Format (PDF) of Operating and Maintenance Manuals. Refer to Division 1 Specifications for additional requirements.
3. Each OMM shall be assembled into one electronic file or multiple files broken up by section if the file size is larger than 15Mb.
4. Combine all electronic files and arrange as follows, unless otherwise directed in Division 1 Specifications. Include a title tab for each section and an index at the beginning of each individual section. If a section listed below does not apply to the Project, renumber sections accordingly. Multiple files broken up by section are allowed if file size is greater than 15Mb.

    a. First Page --- Title of Project, Owner, Address, Date of Submittal, Name of Contractor and Name of Engineer, including contact information, phone numbers and email addresses.
    b. Second Page --- Index. Index shall include hyperlinks to each section listed.
    c. First Section --- Written description of system contents including where actually located in building, how each part functions individually, and how system works as a whole. Included step by step procedures for startup and shut down for each system and piece of equipment. Conclude with a list of items requiring service and either state the service needed or refer to the Manufacturer's data in the file that describes the proper service.
    d. Second Section --- A copy of each approved Submittal.
    e. Third Section --- A copy of each equipment Manufacturer's operating and maintenance instructions and where applicable, a copy of the equipment startup report. Maintenance instructions shall include name of service agency, spare and replacements parts lists, lubrication instructions, and replacement belt information (size, type and length). For packaged equipment with manufacturer supplied controls, provide information listing any programming that is not a factory default.
    f. Fourth Section --- Temperature Control System component information, drawings and sequences of operation.
    g. Fifth Section --- A copy of the testing, adjusting and balancing report.
    h. Sixth Section --- A copy of all test results performed by the Contractor. Test results shall include pipe cleaning and pressure tests, ductwork pressure tests and freeze protection cable testing.
    i. Seventh Section --- A copy of all valve directories.
    j. Eighth Section --- A copy of all guarantees and warranties.
    k. Ninth Section --- Owner training sign-in sheets including all data utilized in the training sessions.
    l. Tenth Section --- Record Drawings.
    m. Eleventh Section --- A list of attic stock furnished for the project.
    n. Twelfth Section --- Final Punch List with Contractor's responses.

5. The electronic OMM shall be delivered to the Owner and Engineer on portable memory device or optical media - Owner shall be provided with up to 5 copies on separate portable memory devices or optical media and the Engineer shall be provided with a single copy.

    a. OMM index page shall have cross-reference links to each section.
    b. Sections containing more than 30 pages shall have a section index with cross-reference links.

c. PDF text shall be recognizable and shall be searchable by use of a "Ctrl'-F" or "find text" function.

1.8 DEMONSTRATION AND TRAINING

A. Before final payment, demonstrate to the Owner's satisfaction the proper operation of each of the systems provided as part of the Contract Documents.

B. Provide to Owner after all equipment, systems and controls are in operation and at an agreeable time, instructions for the purpose of training Owner's maintenance personnel in the operation and maintenance of all HVAC equipment, systems and controls.

C. Provide a "sign-in" sheet at each training session. A copy of each "sign-in" sheet shall be included in the Operating and Maintenance Manual.

D. Refer to individual Division 23 sections for minimum time periods for training.

E. Deliver to the Owner all special tools and appurtenances for proper operation and maintenance of the equipment provided and request receipt for same. Attach to the Contractor's request for final payment.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Consult the Contract Documents and Submittals pertaining to the work for other trades. Review the field layouts for all trades and make adjustments accordingly in laying out the HVAC work.

B. Examine the work of all other trades when it comes in contact with, or is covered by, work in this Division. Do not attach to, cover up, or finish against any defective work, or install work in a manner which will prevent proper installation of the work of other trades. HVAC Contractor shall be responsible for the costs of adjustments required.

3.2 PRODUCT HANDLING

A. Pay all costs for transportation of materials, equipment to job site.

B. Provide all scaffolding, tackle, hoists, rigging necessary for placing HVAC materials and equipment in their proper place. Scaffolding, hoisting equipment: comply with applicable Federal, State, and Local regulations. Remove temporary work when no longer required.

C. Arrange for packaging of equipment, which must be hoisted, so that there will be no damage or distortion caused by hoisting operation. Protect all piping, ductwork, and equipment from any damage during hoisting operation.

D. Store equipment, controllers, insulation, ductwork, etc., in a dry location and protect from dirt and moisture until building is ready to receive them.

E. Coordinate location of stored items with other trades. Where necessary, store materials and equipment on movable carts so they may be moved when interfering with the work of other trades.

3.3 DAMAGE AND EMERGENCY REPAIRS

A. Assume responsibility for any damage to new or existing building components caused by work provided as part of the Contract Documents, including leaks in piping systems being installed or reworked. Repair all damage without extra cost to Owner.

B. Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during warranty period.

C. Restore roads, grounds, paving, insulation, piping, ductwork building components, etc., to their original condition whenever this work causes damage.

3.4 CLEANING

A. At all times keep premises and building in neat and orderly condition, follow explicitly any instructions in regard to storing of materials, protective measures and disposing of debris.

B. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Thoroughly clean all piping, ductwork, and equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

C. All debris created by the execution of this work shall be removed as directed by the Architect or Owner.

D. Upon completion of work remove all tools, equipment and surplus materials.

3.5 PAINTING

A. Finish painting is included under Division 9 - Finishes, except where specifically called for in Section 230300.

B. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.

C. No equipment, piping or ductwork shall be painted before being tested.

D. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match existing finish.

E. Under no circumstance shall any open cabling be painted.

3.6 INDOOR AIR QUALITY

A. Provide temporary ventilation and/or filtration systems of sufficient size and quantity to ensure complete removal of all odors, fumes, and airborne contaminants generated. Maintain 25 feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

B. If the building HVAC system is used and adjustments are made for ventilation purposes, rebalance systems to maintain occupied areas pressurization and air change requirements.

C. Arrange with Owner to override the HVAC system control of night setback functions to assist with ventilation of building.

D. Comply with SMACNA guideline "IAQ Guidelines for Occupied Buildings Under Construction" Second Edition - 2007.

END OF SECTION

SECTION 230200 – HVAC DEMOLITION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. HVAC equipment, piping, ductwork, and systems indicated on the Demolition Drawings are shown to indicate the extent of demolition only and are not intended to be a record drawing of the existing conditions. The Drawings and Specifications establish the minimum standards for workmanship and materials.

1. If additional interpretation is required regarding the scope of demolition, contact the Engineer prior to bid.

B. Include all labor, materials, equipment, services, and permits necessary for completion of the demolition work.

C. Provide protection for all adjacent areas before, during, and after execution of the demolition work.

D. Comply with all the rules and regulations of local and state Authorities Having Jurisdiction, including applicable OSHA safety requirements.

E. Visit the site and become familiar with conditions affecting the demolition work. No additional compensation shall be approved on claims that arise from a lack of knowledge of the existing conditions.

F. Normal building functions shall be maintained during the demolition work. Coordinate the day and time of any temporary building system interruptions with the Owner. Additional compensation shall not be approved for premium time effort.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment for completion of the demolition work as described within the Specifications and on the Drawings.

B. Materials and equipment shall be new and UL labeled for the application.

PART 3 - EXECUTION

3.1 GENERAL DEMOLITION WORK

A. Disconnect and remove existing HVAC Work made necessary because of Project alterations as indicated or implied on the Contract Documents of all trades. Relocate equipment and/or devices where indicated. Existing HVAC equipment, piping, ductwork and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not.

B. HVAC equipment, piping, ductwork and systems shall be de-energized prior to disconnection and removal.

C. Demolition Work under this Contract shall be accomplished by the Contractor in complete accordance with the Construction Procedure and Progress Schedule specified under Division 1. Proposal shall include any special phasing requirements related to demolition work as described in the Division 1 Specifications.

D. Remove existing equipment indicated including piping and ductwork connections. Existing equipment shown as being reused or relocated shall be carefully removed, stored on the premises, and refurbished before reinstallation.

E. Equipment to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for delivery to the Owner. All other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

F. Remove all previously abandoned equipment, piping, and ductwork encountered above existing ceilings.

G. Where required, re-support existing to remain piping and ductwork above ceilings being removed.

H. Remove piping and ductwork as described on the Drawings. Cap or plug as indicated or as required by Code. Insulate portion of system left exposed by the piping or ductwork removal. Insulation shall match that of the existing adjacent insulation or be as specified for new service. Identify in the field where piping or ductwork connections are to be reused.

I. Provide drainage, capping, and re-filling as necessary to isolate portions of systems to enable full or partial demolition.

J. Provide valves as necessary whether indicated or not to isolate portions of systems to enable full or partial demolition and to make ready for re-connection of the new work.

K. In case of existing valves failures, replace valves in kind or as specified for new service to enable positive shut-off and keep with project schedule as much as possible. Report any such cases immediately upon discovery to the Architect or Engineer.

L. For portions of existing piping and ductwork systems to be re-used, visually inspect for signs of leaks. Report any such cases immediately upon discovery to the Architect or Engineer. Provide testing similar to that as required for new piping and ductwork systems to ensure adequate condition.

M. Remove temperature control devices and components associated with removed equipment, piping, and ductwork including controllers, sensors, actuators, wiring, conduit, etc.

N. Where Building Automation Systems wiring is interrupted because of the demolition Work, Contractor shall reroute or relocate, modify and reconnect to provide a continuous system.

O. Cutting, patching, finishing, etc., for removed or relocated HVAC equipment, piping, ductwork, and systems shall be included as part of the HVAC Work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing construction. Patching shall be performed by the qualified trade.

P. Where equipment, piping, ductwork and systems are removed from fire or smoke rated construction, penetrations shall be patched to match existing ratings with suitable materials matching existing construction. Patching shall be performed by the qualified trade.

Q. Remove and reinstall existing ceiling tiles in areas outside the scope of demolition work as required to complete the demolition work outlined within these Specifications or indicated on the Demolition Drawings. Damaged tiles shall be replaced to match the existing.

3.2 MERCURY

A. Where existing thermostats contain mercury or mercury based products follow EPA universal waste rule, Regulation 40 CFR 273 for removal, transportation and recycling.

3.3 REFRIGERANTS

A. Where existing systems contain CFCs, HCFCs, or HFCs, Contractor personnel shall have a UNIVERSAL certification as required by Environmental Protection Agency, Section 608 Regulatory Requirements: Stationary Refrigeration and Air Conditioning.

END OF SECTION

SECTION 230300 - HVAC BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Equipment Pads

B. Inserts, Hangers and Supports

C. Roof Curbs and Supports

D. Roof Flashings

E. Electrical Connections

F. Vibration Isolation

G. Equipment Identification

H. Access to Equipment and Devices

I. Cleaning

J. Startups

K. Tests and Adjustments

1.2 SUBMITTALS

A. Refer to Sections 23 01 00 and 23 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES. Exceptions: Paint.

1.3 CONSTRUCTION DOCUMENTATION

A. Refer to Section 230101.

B. Submit draft copies of testing, adjusting and balancing report for review prior to final acceptance of Project. Include final copies in the Operating and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT PADS

A. Except where otherwise noted, provide pads for all floor mounted equipment installed under this Division.

B. Construct equipment pads of 3000 pound concrete complete with all necessary anchor bolts, sleeves anchor plates, washers and nuts. Smooth all exposed portions of pads and bevel corners.

C. Unless otherwise noted, make all equipment pads a minimum of 4 inches thick.

2.2 INSERTS, HANGERS, AND SUPPORTS

A. Manufacturer: Basis of design shall be Anvil. Other acceptable manufacturers include Mason, Modern or Erico/Caddy.

B. Provide all inserts, hangers, anchors, guides and supports to properly support and retain piping, ductwork, conduits and equipment; to control expansion, contraction, anchorage, drainage and prevent sway and vibration.

C. Provide inserts for support of work in concrete construction.

D. Provide forged steel beam clamps when attaching to steel construction.

E. Provide supplementary steel angles, channels, and plates where supports are required between building structural members, span the space and attach to building structural members by welding, bolting or anchors.

F. Provide hangers, rollers, threaded rods, turnbuckles, saddles, insulation protectors, anchors, and all other miscellaneous specialties for the attachment of hangers and supports to structure.

1. For up to 3/4 inch diameter rod: Anvil Figure 92, 93, or 94 beam clamps.
2. For 7/8 inch and 1 inch diameter rod: Anvil Figure 134 beam clamp with Anvil Figure 290 eyenut.
3. Pressed steel beam clamps are not permitted.

G. Provide rods, angles, rails, struts, brace plates, and platforms required for suspension or support of piping, conduit and equipment.

H. Do not support piping or ductwork from another pipe or ductwork. Do not support piping or ductwork from conduit. Do not support ceiling framing or lighting from piping or ductwork. Do not support any item from metal roof deck.

I. Where fireproofing is removed or damaged to allow attachment to building structural members, repair to maintain integrity of fireproofing.

J. Refer to Specification 23 20 00 for additional piping support requirements.

K. Refer to Specification 23 30 00 for additional ductwork support requirements.

2.3 ROOF CURBS AND SUPPORTS

A. Where curbs and supports are not specified with HVAC equipment; provide prefabricated roof curbs and equipment supports for equipment mounting.

B. Provide prefabricated roof curbs for ductwork roof penetrations. Provide prefabricated pipe curb assemblies for piping roof penetrations.

C. Provide prefabricated roof supports for horizontal ductwork and piping installed on the roof.

D. Units shall be as manufactured by Custom Curb, Roof Products & System Corp, Pate, or Thycurb; 18 gauge galvanized steel, insulated, continuous welded seams, wood nailer, counterflashing of type and style as indicated.

E. The height of roof curbs and supports shall be a minimum of 12 inches above the finished roof surface, total curb height shall accommodate the roof insulation thickness. Refer to Architectural Drawings for details.

2.4 ROOF FLASHINGS

A. Roof flashings for HVAC equipment are the responsibility of the contractor installing the equipment. Existing roof warranty must be maintained.

2.5 ELECTRICAL CONNECTIONS

A. Refer to those portions of the Contract Documents which establish electrical characteristics and furnish equipment to operate on that service.

B. Starters shall be provided under Division 26 Work, unless otherwise noted. Starters to be provided with proper NEMA enclosures, surface or flush application as required. Where equipment has magnetic starters furnished as an integral part of the equipment, disconnect switches shall be provided under Division 26 Work.

C. Provide coordinated wiring diagrams for motor equipment of heating, ventilating, air conditioning, and temperature control conforming to system operation specified. Provide line diagrams, power diagrams, terminal connections. Submit all such drawings as shop drawings.

D. Provide power wiring from closest available circuit breaker for powering of the temperature controls system. Install according to the requirements of Division 26.

E. Install all equipment requiring an electrical connection in such a manner so that proper clearance for service is provided per the National Electric Code.

2.6 VIBRATION ISOLATION

A. Furnish and install vibration isolating mountings to isolate from the structure, by means of resilient vibration and noise isolators, HVAC equipment having rotating or reciprocating parts. Guarantee that isolators to provide isolation efficiencies according to this Specification. Base selection on equipment purchased, power dissipated, frequency, weight distribution and nature of the building structure.

B. Design mountings to permit attachment to the equipment base or pad and to the structure and select for uniform deflection allowing for unequal weight distribution.

C. Provide selections by the manufacturer of the mountings to provide a transmissibility not exceeding 10 percent.

D. Vibration or noise created in any part of the building by the operation of any equipment furnished and/or installed under this Contract will be prohibited. Take all precautions by isolating the various items of equipment from the building structure.

E. Isolate HVAC equipment as follows:

1. Mount floor mounted centrifugal fans, air conditioning and/or heating and ventilating units on stable steel springs, in series with ribbed rubber isolators. If the drive motor is not supported directly on the fan, mount both units on an integral structural steel base supplied by the isolator manufacturer, of sufficient rigidity to maintain alignment between the fan and the drive motor. Mount the base, in turn, on steel spring isolators sized to provide minimum of 90 percent effective isolation.
2. Suspend ceiling suspended centrifugal fans, air conditioning, and/or heating and ventilating units by threaded rods from the overhead structure. Incorporate resilient hangers using steel springs and precompressed molded fiberglass inserts into each supporting rod. Size the isolators to provide minimum of 90 percent effective isolation.
3. Mount hermetic centrifugal water chillers, unless otherwise noted, on pre-compressed molded fiberglass or rubber in shear isolation pads. Place pads under the compressor unit, and under the evaporator condenser unit. Provide isolators with 90 percent isolation efficiency.
4. Mount reciprocating compressors directly on steel spring vibration isolators in combination with compressed molded fiberglass noise isolators. Provide isolators with 95 percent isolation efficiency.
5. Air handling units with internally isolated fans do not require additional unit casing isolation.

F. Support piping and ductwork independently of the mechanical equipment and isolate as follows:

1. Use flexible connections between ductwork and air handling equipment, and attach the ductwork rigidly to the structure.

G. Base isolator efficiency on the lowest operating speed of the supported equipment. Furnish as part the isolator manufacturer's submittal data, deflections and isolating efficiencies for the isolators supporting each piece of equipment.

H. Manufacturer: Mason Industries, Vibration Eliminator Co., Kinetics Noise Control or VCM Group.

2.7 EQUIPMENT IDENTIFICATION

A. Equipment Nameplates

1. Equipment nameplates shall be laminated phenolic with a black surface and white core. Use 1/16 inch thick material for plates up to 2 inch by 4 inch. For larger sizes use 1/8 inch thick material.
2. Lettering shall be condensed Gothic. The space between lines shall be equal to the width of the letters. Use ¼ inch minimum height letters which occupy four to the inch.
3. Nameplates shall be attached to equipment with brass screws or rivets; no adhesive attachments will be permitted.
4. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Location of piping, equipment, ducts, etc., on the drawings are diagrammatic; indicated positions shall be followed as closely as possible, exact locations shall be subject to building construction and interferences with other work. In general, conceal piping and ductwork located outside of equipment rooms. Difficulties preventing the installation of any part of work as indicated, shall be called to the attention of the Architect. Architect will determine locations and changes. Contractor shall install the work accordingly. Architect reserves right to make minor changes in location of any part of the work up to the time of roughing-in without additional cost.

B. Attempts have been made to identify existing equipment locations and piping and ductwork routing and sizes with use of existing drawings and field observations. Contractor shall field verify all existing information, report any discrepancies to the Architect or Engineer and note on the Record Drawings.

C. At locations in project involving alterations, assume responsibility for removal, rerouting, protection and replacement of existing facilities as necessary to install new work. Work to be executed by craft which customarily or by jurisdictional award performs such service. Refer to 23 02 00 for additional information.

D. Coordinate all work with the phasing of the Project. Certain services must remain active to serve occupied areas during construction. Coordinate all phasing requirements with the Owner.

E. Install all materials and equipment in a neat and workmanlike manner by competent specialist for each subtrade. The installation of any materials and equipment not meeting these standards may require removal and reinstallation at no additional cost to the Owner.

F. Locate piping, ductwork and other services, in pipe spaces, to ensure maximum accessibility. Where necessary to cross pipe spaces, crossing must be made near the floor or 6 feet or more above floor.

G. Install, connect equipment, services, materials according to best engineering practice and in conformity with manufacturer's printed instructions. Provide complete auxiliary piping, water seals, valves, electric connections, controls, etc., as recommended by respective equipment manufacturer or required for proper operation.

H. Take all measurements and determine all elevations at the building.

I. All roof mounted equipment shall be installed a minimum of 10 feet from edge of roof, unless indicated otherwise.

3.2 ACCESS TO EQUIPMENT AND DEVICES

A. All valves, dampers, air vents, equipment, control components and other devices requiring examination, adjustment, service, and maintenance shall be accessible. If located above drywall ceiling or behind finished walls, provide an access door. Coordinate all access door locations with the Architect and General Trades.

B. To ensure accessibility during and after construction, when a device is installed, its location shall be marked with securely attached temporary signage. Signage shall indicate the amount of clearance required for the specific device. Signage shall remain in place until the ceiling or access door is installed or until substantial completion.

C. Clearance shall include not only code required clearance but also clearance for Owner's staff to access the device. This access shall be from the floor or from the floor level using normal maintenance ladders and apparatus to meet all OSHA requirements. Consideration shall be given to accessing a device through an access door.

D. Where a device is installed above finished ceilings, signage shall be hung below the device at the finished ceiling level. Where a device is exposed, in open ceiling areas, signage shall be hung at approximately 8' above the floor level.

E. HVAC Contractor shall monitor these access locations until substantial completion and notify Architect, Owner and Engineer when the access area is encroached upon so that corrective action may be taken immediately.

F. Corrective action shall be the responsibility of the trade encroaching the access area unless identified that the equipment in question is installed incorrectly.

3.3 CLEANING

A. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Thoroughly clean all piping, ductwork, and equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

B. Do not operate air handling equipment without proper filtration. Replace all filters used during construction with proper system filters at completion of work. Refer to Specification 23 30 00 for additional information.

C. Refer to Specification 23 20 00 for pipe cleaning requirements.

D. Refer to Specification 23 30 00 for ductwork cleaning requirements.

3.4 STARTUPS

A. Coordinate schedule for start-up of various equipment and systems. Notify Owner seven days prior to start-up of each item.

B. Lubrication, Packing and Supplies

1. Properly lubricate all rotating, reciprocating equipment before it is started with correct grade, type and quantity of lubricant.
2. Check each shaft containing a packing gland for condition by backing packing gland off and examine for proper grade, amount and type of packing as recommended by manufacturer.
3. Maintain all lubrication, gaskets and packing during construction; assure that at the time of acceptance all are in first class condition.
4. Provide all supplies required to place equipment in operation

C. Verify that each piece of equipment or system has been checked for proper drive rotation, alignment, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up by service technicians employed or authorized by the manufacturer to provide startup service according to manufacturer's instructions.

G. Provide a factory authorized representative for startup of the following equipment. Representative shall be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

1. Furnace
2. Condensing units and associated cooling coil
3. Carbon monoxide and nitrogen dioxide monitoring system
4. Gas-fired unit heaters
5. Gas-fired radiant heaters
6. Packaged terminal air conditioners

H. Provide written reports that equipment and systems have been properly installed and are functioning correctly. Where start-up is by a factory authorized representative, report shall be on manufacturer's forms intended for the purpose. Reports shall be included in the Operating and Maintenance Manual.

I. Equipment and systems not installed properly or operating correctly shall be corrected or replaced and its proper operation shall again be verified. This Contractor shall be responsible for the costs of any and all re-inspections.

3.5 TESTS AND ADJUSTMENTS

A. Obtain all inspections required by law, ordinances, rules, regulations of authorities having jurisdiction, furnish certificates of such inspections. Pay all fees, and provide all equipment, power and labor necessary for inspections and tests.

B. During testing period maintain on the project an engineer thoroughly familiar with all phases for as long a period as required to thoroughly adjust all systems and demonstrate that they are functioning properly.

C. Perform all tests, including but not limited to those specified, make necessary adjustments to obtain specified equipment and system characteristics.

D. Do not consider work under this Specification complete until required inspections have been obtained, tests performed, necessary adjustments made and satisfactory evidence of compliance has been submitted. Architect reserves right to make spot checks to determine accuracy and completeness of final adjustments.

E. Refer to Specification 23 20 00 for piping pressure testing requirements.

F. Refer to Specification 23 30 00 for ductwork leakage testing requirements.

G. HVAC Systems Testing, Adjusting, and Balancing

1. Provide services of a certified AABC or NEBB test agency to test and balance HVAC systems. Conduct all tests and provide a report in accordance with Associated Air Balance Council, National Standards for Field Measurements and Instrumentation.
2. The testing and balancing agency and the temperature control installer shall cooperate in a joint effort as necessary to achieve properly tested and balanced systems.

    a. The responsibility of the temperature control installer will be to establish the mode of operation required by the testing and balancing agency for proper testing and to perform programming and/or setpoint changes as required by the testing and balancing agency.
    b. The responsibility of the testing and balancing agency is to perform all the actual testing and balancing of all HVAC equipment and to verify the operation of HVAC temperature control system.

3. The Mechanical Contractor shall make all changes in sheaves, belts, and dampers and shall add dampers as requested by the Air Balance Agency for correct balance at no additional cost to the Owner.
4. Do not begin adjustments until systems have been completed and are in full working order. Put all heating, ventilating, exhaust and air conditioning systems and equipment into full operation and continue operation of same during each working day of testing and balancing. All testing and balancing shall be done under both summer and winter design conditions.
5. Perform tests and balance systems in accordance with following requirements:

    a. Test and adjust all air handling systems for design flow of supply, return, relief, exhaust and outside air to within 10 percent of design requirements. Where supply and return or exhaust air quantities in a room or area are not equal the required air quantity differential indicated must be obtained to maintain a positive or negative pressure.
    b. Identify each diffuser, grille and register as to location and area; in readings and tests of diffusers, grilles and registers, tabulate required velocity and CFM, and test velocity and CFM after adjustment and list size, type and manufacturer of diffusers, grilles and registers. Adjust supply diffusers, grilles and registers for proper air distribution pattern to eliminate drafts.
    c. For each piece of air handling equipment, list fan data, motor and drive. Test and record fan motor horsepower, full load amperes, fan speed, system suction and discharge static pressure. Determine CFM by means of velocity traverse at a minimum of three fan diameters from fan outlet.
    d. Balance of exhaust fans and their integration/operation with the carbon monoxide and nitrogen dioxide
    e. Balance hot water heating radiation, coils and unit heaters to obtain required water temperature drop corrected for entering water conditions.
    f. Balance all water using equipment, such as convectors, cooling coils, condensers, chillers, reheat coils, etc., to obtain required water pressure drop and flow rate. List specified flow rate and water pressure drop for each piece of equipment. Tabulate an air/water balance showing entering and leaving water temperatures and entering and leaving air dry and wet bulb temperatures.

g. List design data for each pump, obtain by measurement and tabulate pump motor voltage, pump motor operating current, pump head with no flow and with full flow. Submit manufacturer's pump curves, indicating operating point of each pump.
h. Set minimum outside air damper position by relationship to mixed air temperature.
i. Calibrate all temperature control and other automatic devices and thoroughly test. Guarantee all instruments to function on a variation of plus or minus 1-1/2 degrees and make adjustments to achieve this result during first year without cost to Owner.
j. Record all final equipment data after system balancing is complete. Provide final operating condition of HVAC systems.
k. Furnish 5 AABC or NEBB certified copies of balancing results.
l. Perform a "spot" recheck of balancing conditions between 30 to 90 days after balancing operations jointly with a representative of the temperature control installer, who is capable of making adjustments to the temperature control system. Include a check of space temperatures, calibration of controls, pump heads, fan performance, and any adjustments, thereto. Submit written report to Architect.
m. After or during one complete heating cooling season, make any minor adjustments that may be necessary to insure uniform temperatures throughout the space.

6. Submit Testing, Adjusting and Balancing Report to Engineer for review. After review, perform additional testing, adjusting and balancing as noted and revise report as required.

a. At project completion, furnish one (1) AABC or NEBB certified hard copy of Final Report and one (1) electronic copy on a portable memory device. Refer to Section 230100.
b. In addition, a final report shall be included in the Operating and Maintenance Manual

3.6 PAINTING

A. Division 9 Contractor shall be responsible for the painting of all exposed equipment, iron work, supports, hangers, pipe, pipe covering, ductwork and breechings, except factory finished items, installed in the Contract.

B. "Exposed" as indicated above, shall refer to exposed to view and shall not include piping concealed above ceilings or under floor slabs, buried in walls or installed in mechanical and electrical rooms.

C. Clean and prepare items to be painted as recommended in the paint manufacturer™™s printed recommendations.

3.7 EQUIPMENT IDENTIFICATION

A. Identify each piece of equipment as to nature of service and system number corresponding to designation in Contract Documents, by stenciling with 1 inch high letters or attaching two color engraved nameplates. Equipment designations shall conform to the Owner's Standard.

Item	Type Identification
Supply, Return, and Exhaust Fans	Nameplate
Packaged Terminal Air Conditioners	Nameplate
Motor Starters	Nameplate
Furnaces	Nameplate
Electric Unit Heaters	Nameplate
Switches, Pilot Lights (Remote)	Nameplate

Condensing Units	Nameplate
Gas Unit Heaters	Nameplate
Gas Radiant Heaters	Nameplate
Carbon Monoxide/Nitrogen Dioxide Sensors	Nameplate
Carbon Monoxide/Nitrogen Dioxide Monitoring Control Panel	Nameplate

END OF SECTION

SECTION 230400 - HVAC FIRESTOPPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work of this Section includes, but is not limited to, furnishing and installing firestopping for fire-rated construction in the following areas:

1. All openings in fire-rated floor, wall, ceiling and roof assemblies, both empty and those accommodating penetrating items.
2. Openings at each floor level in shafts or stairwells.
3. Empty openings intentionally designed as spare openings in fire rated Construction.

B. Penetrating items shall include the following:

1. Cables.
2. Conduit.
3. Pipes without insulation.
4. Pipes with insulation. All insulation must remain intact, undamaged and shall run continuously through walls and floors.
5. Ductwork without fire dampers. Where insulated, all insulation must remain intact, undamaged and shall run continuously through walls and floors.

1.2 QUALITY ASSURANCE

A. General

1. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings required by local building code and as tested by nationally accepted test agencies per fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance of the assembly being penetrated.
2. Manufacturer¢¢s engineering judgments will be accepted for non-standard applications or where no tested system exists. Drawings for engineering judgments must indicate the UL tested system or systems upon which the judgment is based, in order to evaluate the engineering judgment against a known performance. Engineering judgments shall be approved by the Architect.
3. Firestopping materials and systems shall be capable of closing or filling openings created by:

   a. The burning or melting of combustible materials.
   b. Deflection of materials due to thermal expansion.

4. Firestopping material shall be non-halogenated, lead and asbestos free and shall not incorporate nor require the use of hazardous solvents.
5. Firestop products which dissolve in water after curing are not acceptable.
6. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to a Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Manufacturer's Field Representative: The Manufacturer of the firestop material of this Section shall provide a qualified field representative at the site.

D. Pre-Installation Conference: Contractor shall hold a pre-installation conference with representatives of the Architect, Contractor, Installer, Materials Manufacturer and various trades involved in the Work, to review conditions affecting the installation and consistency of manufacturer to be used by all trades.

E. Conform to Manufacturer's printed instructions for installation in accordance with a U.L rated system or Manufacturer¢¢s engineering judgement.

F. Codes and Standards

1. ASTM E 84
2. ASTM E 119
3. ASTM E 814
4. UL 263
5. UL 1479

1.3 SUBMITTALS

A. Refer to Sections 23 01 00 and 23 01 01 for additional requirements.

B. All submittals shall conform completely to the requirements of the Contract Documents.

C. Product Data: For each type of material to be installed, literature shall indicate product characteristics, typical uses, performance, test data and Manufacturer's installation procedures.

D. Shop Drawings: Include U.L. rated system number and details for each type of penetration or configuration.

1. Show typical installation details including:

a. Minimum and maximum allowable annular spacing.
b. Base material composition.
c. Firestop materials selected.
d. Applied thickness required to achieve the hourly rating.

E. Where required, submit Product Data and Shop Drawings to the Authority Having Jurisdiction (AHJ) for review and approval. Information shall include the Manufacturer's assembly detail with UL system number, technical data and installation instructions for each penetration type occurring on the project.

F. Close-out Documents

1. Final approved product data and shop drawings of all materials installed shall be included in operating and maintenance manuals.
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer¢¢s labels identifying product and manufacturer, UL label, date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes. Materials shall be stored off the ground and protected from environmental conditions as required by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.5 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, provide for curing in accordance with manufacturer suggested temperature requirements.

B. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

C. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

D. Do not use materials that contain flammable solvents.

E. Do not install water based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.

1.6 PROTECTION

A. Where firestopping is installed at locations which shall remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.7 SEQUENCING

A. Coordinate this work as required with work of other trades.

B. Firestopping shall precede finishing of gypsum board.Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal deck placement or composite deck installation but before placement of concrete.

1.8 WARRANTY

A. Contractor shall provide written certification that all firestopping was installed in accordance with the Manufacturer's written instructions for UL tested assemblies and that all firestop systems installed meet firestopping requirements as herein specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials shall meet the requirements specified herein.

B. For applications where combustible penetrants are involved, i.e. insulated or plastic pipe, a suitable intumescent material must be used.

2.2 ACCEPTABLE MANUFACTURERS

A. Specified Technologies, Inc. (STI)

B. 3M

C. Hilti, Inc.

2.3 FIRESTOP MATERIALS

A. Firestop Mortar

B. Intumescent Firestop Sealants and Caulks

C. Elastomeric Firestop Sealants and Caulks

D. Endothermic Firestop Sealants and Caulks

E. Firestop Putty

F. Rough-in Box Inserts

G. Firestop Pillows/Blocks

H. Fire Rated Pathways

I. Firestop Grommets

J. Firestop Collars

K. Wrap Strips

L. Cast in Place Devices

M. Firestop Foams

N. Composite Sheets

O. Intumescent Gaskets

PART 3 - EXECUTION

3.1 GENERAL

A. In an occupied building, permanent firestopping shall be installed within 24 hours of penetrating a fire rated assembly. If permanent firestopping cannot be installed within this time period, temporary firestop pillows/blocks are permitted, where installation allows, until permanent firestop materials can be properly installed.

3.2 INSPECTION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until the Contractor, in a manner acceptable to the Architect has corrected unsatisfactory conditions.

B. Verify that environmental conditions are safe and suitable for the installation of the firestop products.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified elsewhere whether or not firestopping is indicated and, if indicated whether such material is designed as insulation, safing, or otherwise.
2. All firestopping shall be installed in accordance to the UL rated system designed for the application.
3. Grout, Mortar or Gypsum based products shall not be installed in lieu of firestopping material specified herein.
4. All smoke walls (smoke barriers, smoke partitions, etc.), rated or non-rated, shall be firestopped with systems designed to maintain a minimum 1 hour rating or that which is equal to the rating of the wall.

B. Penetrations - Provide firestopping as follows:

1. Where penetrations pass through one or both surfaces of a fire rated floor or wall.
2. Where a penetration occurs through fire rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition.
3. Except for slab on grade, where penetrations pass through a non-fire rated floor.
4. The requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening. Upon installation of cabling through sleeve, firestop the remaining open area within the conduit.

C. Where demolition has occurred in rated walls, floors and assemblies, the material used to patch the opening shall match the material used for the assembly construction. Firestopping materials may be utilized upon approval of Architect and Engineer. Materials used shall be provided with submittals. Work performed shall be the responsibility of the Contractor whose work was removed, performed by the appropriate trade.

3.4 PREPARATION

A. Surface to receive firestop shall be free of dirt, dust, grease, oil, oil from release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items.

B. Substrate shall be frost free.

3.5 INSTALLATIONS

A. General

1. Sleeves and core-drilled holes shall be sized at least 1-1/2" larger in diameter than penetrating items.
2. Installation of firestops shall be performed by applicators/installers qualified and trained by the Manufacturer. Installation shall be performed in strict accordance with the Manufacturer's detailed installation procedures.
3. Apply firestops in strict accordance with UL rated system designs, and Manufacturer's recommendations.
4. Coordinate with all other trades to assure that all items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other Construction which would conceal penetrations are not erected prior to the installation of firestop.
5. Gun grade sealants and putties shall be tooled into place to insure proper adhesion to penetrations and surrounding surfaces.
6. Where existing penetrations are reused that contain remnants of existing firestop products remain, remove all existing firestopping.

B. Dam Construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating.
2. Placement of dams shall not interfere with functions or adversely affect the appearance of adjacent construction.

C. Field Quality Control

1. Install work in full accordance with rules, regulations, and safety requirements of Federal, State, County and City authorities having jurisdiction over premises. Do not construe this as relieving Contractor from compliance with any requirements of the Specifications which are in excess of Code requirements and not in conflict therewith.
2. Correct unacceptable firestopping and provide additional inspection to verify compliance with this Specification at no additional cost.
3. Finish surfaces of firestopping that is to remain exposed in the completed work to a uniform and level condition.

3.6 LABELING

A. Where firestopping installations occur, Contractor shall provide a label adjacent to each penetration. Label shall include:

1. UL rated system used.
2. Date of installation.
3. Name of installing Contractor

B. Labels shall be furnished by the firestop manufacturer.

END OF SECTION

SECTION 230505 - HVAC EQUIPMENT MOTOR REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Motors

B. Drives and Guards

PART 2 - PRODUCTS

2.1 MOTORS

A. For each item of equipment requiring electric drive, provide a motor having starting and running characteristics consistent with the torque and speed requirements of the driven machine.

B. For design, construction, and performance characteristics, conform to applicable provisions of latest NEMA, IEEE, and NEC Standards.

C. Duty: Continuous duty at ambient temperature of 40 deg C.

D. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

E. For frame sizes 215T and above, furnish shouldered lifting eyebolts or cast provisions within for handling convenience.

F. Furnish with stainless steel nameplates with manufacturer's name, model number, serial number, horsepower, voltage, phase, frequency, RPM, full load amps, locked rotor amps or code, frame size, service factor, power factor, nominal full-load efficiency, bearing sizes, insulation class, and rated ambient temperature.

G. Three Phase Motors

1. Efficiency: NEMA premium efficient electric motors with efficiencies complying with NEMA MG 1 Table 12-12. Motors ¾ HP and smaller may be the equipment manufacturer's standard and need not conform to Table 12-12.
2. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
3. Thermal Protection: Conform to NEMA MG 1 requirements for thermally protected motors.
4. Insulation: Class F.
5. Service Factor: 1.15
6. Enclosure Types:

   a. Open Drip Proof (ODP): Unless noted otherwise, all motors shall be ODP.
   b. Totally Enclosed Fan Cooled (TEFC): Refer to equipment schedules.
   c. Explosion Proof: UL approved and labeled for hazard classification, with over-temperature protection. Refer to equipment schedules.

7. All equipment specified to operate with variable frequency drives shall be provided with motors specifically designed for variable speed operation with high efficiency at part load conditions as required by NEMA MG-1 and with motor insulation rated for variable frequency drive operation.

    a. Include a maintenance free, circumferential, conductive micro fiber shaft grounding ring to discharge shaft currents to ground (AEGIS SGR Bearing Protection Ring).
    b. Motors less than 100 HP size shall be provided with a single shaft grounding ring provided on the drive end of the motor.

8. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for lubrication and suitable for radial and thrust loading.

H. Single Phase Motors

1. Motors shall be one of the following, to suit starting torque and requirements of specific motor application. Refer to equipment specifications and schedules.

    a. Permanent-split capacitor.
    b. Split phase.
    c. Capacitor start, inductor run.
    d. Capacitor start, capacitor run.
    e. Electronically Commutated Motor (ECM).

2. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal protection device shall automatically reset when motor temperature returns to normal range.
3. Bearings: Prelubricated, anti-friction ball bearings or sleeve bearings suitable for radial and thrust loading.

I. Acceptable Manufacturers: Baldor, Lincoln, Marathon, or US Motor.

2.2 DRIVES AND GUARDS

A. For each item of belt driven equipment, provide an adjustable drive sheave with adjustable limits plus or minus 12-1/2 percent, based on a service factor of 1.5 as applied to motor nameplate rating. Provide drives of one horsepower and over with at least two belts, with all multiple belt sets matched. Non-adjustable drive sheaves will be acceptable for motors of 30 HP and over.

B. Provide substantial drive guard for each belt drive secured to the equipment. Provide openings in skirt guards for insertion of revolution counter at drive sheave and driven sheave centers. Provide conveniently removable coupling guard for direct driven equipment.

C. For each item of direct driven equipment which is not of extended shaft or close coupled design, provide an approved type flexible coupling.

D. Provide a typed list of belt drives, listing each item with pitch diameter, bore size, and key way dimensions of each sheave and manufacturer's replacement belt numbers. Bind lists in Operating and Maintenance Manuals.

E. Provide all necessary changes in drive sheaves and/or belts as required to obtain specified air deliveries.

PART 3 - EXECUTION

3.1 INSTALLATION

A. During submittal phase, verify all motor voltage and horsepower requirements with Division 26. Notify engineer if these do not match.

B. Install and align all motors. Prior to equipment startup recheck alignment after all piping and ductwork connections have been completed.

C. Where required, grease all motor bearings per manufacturer's recommendations prior to equipment startup.

D. Motors shall be protected from damage and kept clean during construction. If dust collects on or in a motor, it shall be cleaned per the manufacturer's recommendations.

END OF SECTION

SECTION 230700 - HVAC INSULATION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. All labor, equipment, accessories, materials and services required to provide the following insulation systems:

1. Pipe Insulation
2. Ductwork Insulation

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 QUALITY ASSURANCE

A. The Insulation Contractor shall be regularly engaged in the installation of insulation systems and shall have a minimum of five (5) years of demonstrated experience in the installation of insulation systems similar in type and size.

B. Install insulation materials and accessories in accordance with the manufacturer's published instructions, recognized industry standards and this specification to ensure that it will serve its intended purpose.

PART 2 - PRODUCTS

2.1 GENERAL

A. Insulation material, performance and thickness shall comply with ASHRAE 90.1 - 2010 requirements.

B. Provide all insulation material (insulation, jackets, fitting covers, tapes, adhesives, cements, mastics, sealants, coatings and finishes) with a composite Fire and Smoke Hazard rating as tested under procedure ASTM E-84 or UL 723, not exceeding the following:

1. Flame Spread 25
2. Smoke Developed 50

C. External duct insulation shall be legibly printed or identified at intervals not to exceed 36 inches with the name of the manufacturer, the thermal resistance R-value at the specified thickness and the flame spread and smoke developed indexes of the composite materials.

D. Mastics, cements, coatings, adhesives, sealants and finishes shall be suitable for contact with the surface material for which it is applied to and rated for the working temperature of the service. All adhesives and sealants wet applied on site shall comply with chemical content requirements of the South Coastal Air Quality Management District (SCAQMQ) Rule 1168. Acceptable Manufacturers: Foster Products, Childers Products and Vimasco Corporation.

2.2 PIPE INSULATION

A. Insulation Types:

1. Fiberglass: Owens-Corning SSL II-ASJ one piece fiberglass pipe insulation with All Service Jacket and double adhesive longitudinal lap seal. Furnish as a complete system with pressure sensitive butt strip seals having factory applied adhesives. Other acceptable manufacturers: Knauf and Johns Manville.
2. Closed-Cell: Armacell AP/Armaflex Black Lapseal fiber free elastomeric tube insulation. Furnish as a complete system with contact adhesives, pressure-sensitive seam tape, prefabricated fitting covers and pre-insulated pipe hanger supports (Armacell Armafix Insulation Pipe Hanger). For non-EPDM elastomeric insulation located outdoors provide a UV resistant protective coating - Armaflex WB. Other acceptable manufacturers: K-Flex USA and Aeroflex USA, Inc.

B. Fiberglass Insulation Protection

1. PVC Fitting Covers complete with premolded fiberglass inserts with vinyl vapor barrier facing, solvent weld adhesives, stainless steel tack fasteners, silicone caulking and adhesive tapes. Acceptable Manufacturers: Proto Corporation, Speedline Corporation and Zeston.

C. Refer to Pipe Insulation Schedule on Drawings.

2.3 DUCTWORK INSULATION

A. Insulation Types:

1. Wrap FRK: Owens-Corning SOFTR Duct Wrap, Type 100, 1.00 pcf, glass fiber blanket insulation factory laminated to a Foil Reinforced Kraft facing.
2. Rigid ASJ: Owens-Corning FIBERGLAS Insulation, Type 705, 6.0 pcf, glass fiber rigid insulation with factory applied white All Service Jacket. For round ductwork, use Owens-Corning FIBERGLAS Pipe and Tank Insulation with All Service Jacket.
3. All insulation shall by furnished as a complete system with pressure-sensitive tape matching the facing.
4. Other acceptable manufacturers: Knauf and Johns Manville.

B. Provide insulation for the complete system, including but not limited to, reheat coils, sound attenuators, motor operated dampers and smoke dampers. Insulation thickness shall match that as required for the ductwork.

C. Insulation shall include full thickness coverage for standing seams, flanges and steel angle supports.

D. Refer to Ductwork Insulation Schedule on Drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Install insulation products according to manufacturer's published instructions, this specification and recognized industry standards to ensure it will serve its intended purpose.

B. Protect insulation stored on site and during delivery from damage and moisture such as rainwater and building system leaks.

C. Ensure that insulation is clean, dry, and in good mechanical condition and that all factory-applied facings are intact and undamaged. Wet, dirty, or damaged insulation is not acceptable for installation

D. Install insulation over clean dry surfaces.

E. Install insulation subsequent to pressure testing and painting.

F. Install insulation materials with smooth and even surfaces. Rework poorly fitted joints. Do not use joint sealer or mastic as filler for joint gaps or excessive voids resulting from poor workmanship.

G. Once in place, all tape shall be sealed with a squeegee type device provided by the Manufacturer.

H. Repair existing pipe, ductwork and equipment insulation where removed to make new connections, to add temperature controls, or where damaged by new construction. Use same insulation as specified for new service.

I. Where existing asbestos containing materials are discovered or suspected notify the building Owner immediately so they can be removed under a separate "Asbestos Removal Contract" direct with the Owner.

3.2 PIPE INSULATION

A. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other. Butt insulation joints firmly to ensure complete, tight fit over all piping surfaces.

B. Install insulation continuous through all sleeves and all wall, floor and ceiling penetrations. Sleeves and penetration openings shall be sized accordingly to allow application of full thickness insulation. Coordinate requirements with wall, floor and ceiling construction.

C. On exposed piping, locate insulation and cover seams in least visible locations.

D. Extend all pipe insulation through floors and countertops. Wherever subject to moisture or cleaning equipment provide 0.016 inch thick aluminum jacket of sufficient length for protection.

E. Seal fiberglass pipe insulation longitudinal seams with integral lap seal and butt joints with butt strips. Taper all insulation ends, seal and cover with glass cloth. Insulate valve bodies, fittings, strainer bodies and flanges using premolded fiberglass inserts with PVC Fitting Covers.

F. Seal closed-cell pipe insulation longitudinal seams with integral lap seal and butt joints with seam tape. Apply the manufacturer's recommended adhesive based on the working temperature of service. Insulate all valve bodies, fittings, strainer bodies and flanges using prefabricated fitting covers. Apply two coats of UV resistant protective coating on non-EDPM elastomeric insulation located outdoors.

G. Install insulation continuous through all pipe hanger locations with circumferential insulation joint made outside the hanger. Piping shall be supported in such a manner that the insulation is not compromised by the hanger or the effects of the hanger. Include hanger accessories as follows:

1. Piping 2" and smaller - to protect against compression. Provide insulation protection shields for fiberglass insulation. Provide insulation protection shield with pre-insulated pipe hanger supports for closed-cell insulation.

H. Do not cover valve bonnets, unions and strainer cleanouts with insulation on heating water systems, steam systems and systems where there is no possibility of condensation.

I. Insulation system for refrigerant piping and all piping with a possibility of condensation shall be continuous and provided with a vapor barrier jacket with vapor seal integrity maintained throughout the entire system, including valves and fittings.

1. Longitudinal seams shall be vapor sealed with factory-applied pressure-sensitive adhesive vapor retarder, self-sealing lap. All circumferential joints shall be vapor sealed with factory-furnished, matching pressure-sensitive butt strip seals. Coat all raw edges of pipe insulation with vapor retarder mastic extending onto the adjacent insulation jacketing a minimum of 2 inches.
2. PVC Fitting Covers, installed on fiberglass insulation systems are not vapor barriers. It is important that a separate vapor barrier is intact below and prior to installation of PVC Fitting Covers.
3. Cover valve bodies, unions and strainer cleanouts with prefabricated 1" thick closed-cell insulation, suitable for removal without damaging the permanent adjacent pipe insulation. All insulation shall be form fitted and tight to surface to prevent condensation.
4. Insulation at piping connections to air handling equipment shall be sealed to the unit cabinet.

3.3 DUCTWORK INSULATION

A. Ductwork insulation shall be continuous through all wall and floor penetrations except at fire and fire/smoke damper locations. All joints and seams shall be sealed to maintain a continuous vapor barrier.

B. Insulation shall not cover ductwork access doors. Insulation shall be tapered towards and taped to the entire perimeter of the access door frame.

C. Duct Wrap Insulation:

1. Wrap duct wrap insulation tightly on the ductwork with all circumferential joints butted and longitudinal joints overlapped a minimum of 2 inches
2. Apply contact spray adhesive on bottom of duct prior to installation of insulation to adhere insulation to duct. Secure insulation to the bottom of rectangular ductwork over 24 inches with mechanical fasteners at not more than 18 inches on center.

3. Secure facing for circumferential and longitudinal joints firmly with 5 inch wide pressure sensitive joint sealing tape with finish to match insulation finish. Tape all pin penetrations or punctures in facing.

D. Rigid Duct Insulation:

1. Impale rigid duct insulation over welded pins at maximum of 12 inches on center and secure with self-locking caps. Seal all insulation edges and butt joints firmly with 5 inch wide pressure sensitive joint sealing tape with finish to match insulation finish. Tape all pin penetrations or punctures in facing.

3.4 FIELD QUALITY ASSURANCE

A. Upon completion of all insulation work covered by this specification, visually inspect the work and verify that it has been correctly installed. This may be accomplished while work is in progress to assure compliance with requirements to cover and protect insulation materials during installation.

3.5 PROTECTION

A. Replace damaged insulation which cannot be satisfactorily repaired, including insulation with vapor barrier damage and moisture-saturated insulation.

B. Maintain the integrity of factory-applied vapor barrier jacketing on all insulation, protecting it against puncture, tears or other damage.

C. The insulation installer shall advise all other trades as to requirements for protection of the insulation work during the remainder of the construction period, to avoid damage and deterioration of the finished insulation work.

END OF SECTION

SECTION 232000 - HVAC PIPING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Pipe and Fittings

B. Valves

C. Strainers

D. Unions

E. Dielectric Unions

F. Thermometers

G. Pressure Gauges

H. Floor, Ceiling and Wall Plates

I. Sleeves

J. Inserts, Hangers and Supports

K. Markers and Tags

L. Cleaning

M. Piping Pressure Tests

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES. Exceptions: Floor, Ceiling and Wall Plates, Sleeves, Pressure/Temperature Test Plugs.

C. Refrigerant Piping: Submit refrigerant piping diagrams indicating layout, pipe sizes, accessories ad requirement for multiple suction risers.

1.3 CONSTRUCTION DOCUMENTATION

A. Refer to Section 230101.

B. Submit pipe cleaning and pressure test documentation upon completion of cleaning and testing. Include final copies in the Operating and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Refrigerant - Type "ACR" hard drawn seamless copper tube (ASTM B280).

B. A/C Condensate Drain - Type "L" hard drawn seamless copper tube (ASTM B88) or DWV copper tubing, ASTM B306 or PVC DWV pipe and fittings ASTM D2665.

C. Drain - Piping shall match system piping type unless noted otherwise.

D. Fittings for copper pipe - Wrought copper solder joint type ASTM B16.22. Where silver brazing alloy is used to join pipe and fittings, fittings to be suitable for brazing.

2.2 VALVES

A. Provide all valves of the same manufacturer where possible. Manufacturers: Apollo, Milwaukee, NIBCO, Hammond, or Watts. All valves to be of domestic manufacture.

B. Copper hydronic systems:

1. Shutoff and drain valves 2 inches and smaller: two-piece ball valves with cast bronze body, Teflon seats, full port, blow-out proof stem, adjustable packing gland, 316 stainless steel solid ball and stem, soldered or threaded ends, minimum 150 WSP, 600 WOG. Milwaukee BA-150S.
2. Horizontal check valves 2 inches and smaller: swing type design, Class 125, 200 WOG, bronze body and cap with threaded or soldered ends conforming to ASTM B62. Milwaukee 509 or 1509.
3. Vertical check valves 2 inches and smaller: 250 WOG, center guided, silent, non-slam type. Bronze body, stainless steel spring, threaded ends. Metraflex BSN.

C. Equip ball valves with handle stem extensions where valve is installed in insulated piping systems.

D. Equip valves with locking handle suitable of being locked in the full open or full closed position where indicated. Locking handle design shall accommodate a standard 5/16" pad-lock.

E. Other valves or valve requirements are specified in the Sections applicable to the various systems.

2.3 STRAINERS

A. STR-1: 2 inches and smaller, 'Y' type pipe line strainer, brass or bronze body, threaded ends, 18-8 stainless steel screen with 20 mesh openings, 300 PSIG at 400 degree F. Provide pipe nipple with ball valve for blow down. ITT Hoffman 420C or equivalent by Armstrong, Metraflex, Mueller Steam Specialty or Keckley F150.

2.4 UNIONS

A. Unions in copper piping 2 inches and smaller, cast brass solder fittings with machined and lapped seats suitable for 175 PSI working pressures.

2.5 DIELECTRIC CONNECTIONS

A. Provide at connections between copper and ferrous metal piping materials in chilled water systems ASTM F441, Schedule 80, CPVC threaded pipe nipples, 4 inches minimum length. Provide for dielectric connections in pipe sizes 2 inches and smaller.

B. Provide at connections between copper and ferrous piping in heating water systems Victaulic Clearflow dielectric waterway Style 47. Fitting consists of zinc plated casing with a chemically inert NSF/FDA listed dielectric thermoplastic lining.

2.6 THERMOMETERS

A. Thermometers: Blue color spirit filled glass type industrial thermometer with 9 inch Fahrenheit scale of proper range for service indicated, glass covered case with magnified liquid column, separable well, straight or angle mounted as required.

1. Bi-metal dial type thermometers may be supplied in lieu of spirit filled type.
2. Thermometers located below 6'-0" level: Spirit filled type with 9 inch scale, forward or straight type as required by project conditions. Thermometers serving locations above 6'-0" level to be dial type with remote bulb. Mount 4 inch diameter dials 5'-6" above floor on bracket at appropriate location.

B. Select scale ranges so temperature will fall approximately at mid-scale.

C. Manufacturers: Weiss Instruments, or equivalent by Trerice, Taylor or American.

2.7 PRESSURE GAUGES

A. Provide a steam gauge ahead of and after each pressure reducing valve. Provide gauges in the suction and discharge of all pumps in the HVAC system. Provide gauges having proper ranges as required by conditions. Gauges to have 4-1/2 inch diameter dials, cocks, snubbers, and siphons.

B. Select scale ranges so pressure condition will fall approximately at mid-scale. Manufacturer: Trerice or equivalent by American Consolidated, Marsh or Ashcroft.

2.8 FLOOR, CEILING, AND WALL PLATES

A. Fit all pipe passing exposed through walls, floors, or ceilings in finished rooms with steel or brass escutcheons. Where surface is to receive a paint finish make escutcheons prime painted; otherwise make escutcheons nickel or chrome plated. Where piping is insulated, fit escutcheons outside insulation.

2.9 SLEEVES

A. Where pipes pass through masonry or concrete walls, set Schedule 40 steel pipe sleeves 1 inch larger than outside diameter of pipe, with ends of sleeves flush with wall faces. Sleeves in walls other than masonry or concrete where firestopping is required: machine cut steel pipe or galvanized steel sheet sleeves as required by UL rated system penetration assembly.

B. Where pipes pass through floors above grade, set Schedule 40 galvanized steel pipe sleeves 1 inch larger than the outside diameter of the pipe. Top of sleeve to be 4 inches above finished floor in machine rooms and wet floor locations.

C. Where pipes are insulated, provide sleeves large enough to allow insulation to pass through sleeve. Center pipes in sleeves.

D. Set sleeves true to line, grade; position and plumb or level and so maintain throughout construction period.

E. Where concrete or masonry walls are core drilled for pipe passage steel sleeves are not required.

F. Provide fire stopping between pipe and sleeve or opening as required to maintain the integrity of the fire rating of all walls and floors.

G. Where pipes pass through exterior walls below grade, set Schedule 40 steel pipe or manufactured castings or sleeves 1-1/2 inch larger than the outside diameter of the pipe. Make the pipe to wall penetration closure with "Link-Seal" as manufactured by the Thunderline Corp. or Metraseal.

2.10 INSERTS, HANGERS, AND SUPPORTS

A. Manufacturer: Basis of design shall be Anvil. Other acceptable manufacturers include Mason, Modern or Erico/Caddy.

B. Provide all inserts, hangers, anchors, guides and supports to properly support and retain piping, to control expansion, contraction, anchorage, drainage and prevent sway and vibration.

C. Provide inserts for support of work in concrete construction.

D. Provide forged steel beam clamps when attaching to steel construction.

E. Provide supplementary steel angles, channels, and plates where supports are required between building structural members, span the space and attach to building structural members by welding, bolting or anchors.

F. Provide hangers, rollers, threaded rods, turnbuckles, saddles, insulation protectors, anchors, and all other miscellaneous specialties for the attachment of hangers and supports to structure.

1. For up to 3/4 inch diameter rod: Anvil Figure 92, 93, or 94 beam clamps.
2. For 7/8 inch and 1 inch diameter rod: Anvil Figure 134 beam clamp with Anvil Figure 290 eyenut.
3. Pressed steel beam clamps are not permitted.

G. Provide rods, angles, rails, struts, brace plates, and platforms required for suspension or support of piping, conduit and equipment.

H. Support individual piping from hangers as follows:

1. Uninsulated piping 2 inches and smaller - Anvil Figure 69 galvanized, carbon steel adjustable swivel ring.

2. Copper tubing (uninsulated) - Anvil Figure CT-69 copper plated, carbon steel adjustable swivel ring.
3. Insulated piping 2 inches and smaller - Anvil Figure 260 carbon steel adjustable clevis hanger with the following to protect against insulation compression:

    a. Fiberglass insulation: Anvil Figure 167 18 gage galvanized steel shield between hanger and insulation, minimum 12" long.
    b. Closed-cell insulation: Preinsulated pipe hanger supports matching adjacent insulation.

4. Rollers - Where thermal movement causes a hanger rod to deviate more than five degrees from the vertical or where longitudinal expansion may cause a movement of more than 1/2 inch in the piping, provide Anvil Figure 171, 175 or 181 pipe roller hangers or chairs. Install with pipe covering protection saddles.
5. Plastic piping systems: Anvil Figure 260 carbon steel adjustable clevis hanger with Anvil Figure 168 18 gauge galvanized steel shield between hanger and pipe.

I. Hanger spacing (steel pipe)

J.

	PIPE SIZE	MAXIMUM SPACING	MINIMUM ROD DIAMETER
1.	Up to 1"	6'	3/8"
2.	1-1/4"	8'	3/8"
3.	1-1/2"	10'	3/8"

K. Provide additional lock nut on each threaded support rod.

L. Provide additional hanger support within two feet of each elbow and at valves, strainers and other equipment in pipe lines.

M. Support copper pipe at intervals of not over 10 feet for 1-1/2 inch and larger, and not over 5 feet for 1-1/4 inch and smaller. Provide additional supports where necessary to maintain proper alignment.

N. Hanger spacing (plastic pipe):

O.

	PIPE SIZE	MAXIMUM SPACING
1.	Up to 1"	2.5'
2.	1-1/4" to 3"	3'

P. Support vertical pipe risers with friction clamps at least at alternate floors.

Q. Trapeze hangers may be used for multiple runs of piping. Construct of a steel channel with adjustable hanger rods. Determine hanger spacing by the smallest pipe supported. Install all piping free for independent movement on the trapeze hanger. Provide insulation protection saddles as specified for individual pipe support.

R. Do not support piping from another pipe or ductwork. Do not support piping or ductwork from conduit. Do not support ceiling framing or lighting from piping. Do not support any item from metal roof deck.

S. Provide support saddles where pipes are insulated. All insulation shall be continuous through all hangers.

T. Where fireproofing is removed or damaged to allow attachment to building structural members, repair to maintain integrity of fireproofing.

2.11 MARKERS AND TAGS

A. Pipe Markers

1. Each marker background shall be appropriately color coded with a clearly printed legend to identify the contents of the pipe in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI A13.1).
2. Flow direction arrows shall be included on each marker.
3. Snap-around markers shall be used for overall diameters up to 6" and strap-around markers shall be used above 6" overall diameters.
4. Underground pipe markers shall be detectable tape, color coded and labeled same as indoors.
5. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

B. Valve Tags

1. Tags shall be 2" diameter, 1/16" thick, multilayered acrylic with engraved letters.
2. Lettering shall be ¾" high for type service and ½" for number. Tag shall indicate service and valve number. Letter and number designations shall be coordinated with the Owner.
3. Each service shall be a different color in conformance with the "Scheme for the Identifications of Piping Systems" (ANSI A13.1).
4. Tag shall be attached with chain similar to Seton No. 16 stainless steel jack chain. Use of beaded chain or wire is not acceptable.
5. Acceptable Manufacturers: Seton Nameplate Company, Marking Services Inc.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATION

A. Drawings (floor plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

C. Provide shutoff valves at all branch connections to main, at each piece of apparatus, and in mains to sectionalize the systems and elsewhere as indicated.

D. Install gate valves with stems at 45 degrees or greater above the horizontal position.

E. Install ball and butterfly valves with the stems at the horizontal position and the handle pointing in the direction of flow.

F. Install all valves and equipment with unions or flanges or grooved couplings to facilitate removal.

G. Provide hose end drain valves with cap at all low points, trapped sections and on equipment side of all branch valves to permit draining of all or part of liquid piping systems. Install valves at high points of equipment and piping to allow venting.

H. Pipe equipment drip bases to nearest drain.

I. Locate covered piping a sufficient distance from walls, other pipe, ductwork, or other obstacles, to permit application of the full thickness of insulation specified; if necessary, use extra fittings and pipe.

J. Use Dielectric Connectors where pipe materials change from ferrous to copper.

K. Make piping connections to equipment indicated.

L. Install all piping, including shut-off valves and strainers, to coils, pumps, and equipment line size with reduction in size being made only at inlet to control valve, pump or equipment. Install outlet piping from control valve, pump or equipment, including dirt pockets, full size of outlet connection. Increase to line size and install piping, check valves, strainers and shut-off valves line size.

M. Plug open ends of pipe or equipment at all times during installation to keep dirt and foreign material out of system.

N. Arrange and install all pipes, valves, cleanouts, access openings and equipment so as to be accessible for service. Locate equipment to maintain clearances for tube, coil pulling, periodic servicing.

O. Unless otherwise specified, make branch connections in welded steel piping less than 2/3 of main size with weldolets, butt, or threaded type. Make branch connections 2/3 of main size and larger with weld tees, laterals, or crosses. Shaped nipples are not acceptable.

P. Make reductions in piping lines with reducing coupling or weld fitting reducer.

Q. Support piping so as not to place a strain on valves or equipment.

3.2 JOINTS

A. All pipes must be reamed and cleaned before assembly. Apply pipe compound to male end of threaded joints. Make all welded joints as previously specified.

B. Assemble copper pipe with soldered joints. Make all soldered connections on copper piping by cleaning, fluxing, and soldering with 95-5 tin-antimony solder, except where a silver brazing alloy is specified.

C. Assemble copper refrigerant piping with brazed joints using a silver brazing alloy having a melting point above 1000 degree F.

3.3 EXPANSION

A. Install all piping throughout the project with adequate allowance for expansion to prevent damage to building, equipment, and piping. Provide anchors, loops, expansion compensators, or expansion joints for complete control of movement.

1. Make changes in directions with fittings.
2. Make branch connections to mains for heating risers and equipment with at least two (2) 90 degree elbows.
3. Bullhead connections in any piping service are prohibited.
4. Supplement all loops, joints, compensators, etc. with adequate guides located as close to loops and joints as possible to preserve alignment and pitch. Provide control rods to prevent overextension or compression.
5. Securely attach pipe guides to the building structure.
6. Provide securely supported pipe anchors as required to control expansion, contraction in piping.
7. Attach continuous radiation covers through elongated holes or by other means to prevent buckling.
8. Locate the first pipe guide 4 pipe diameters from the expansion joint or expansion compensator. Locate the second pipe guide 14 pipe diameters from the expansion joint or expansion compensator. Install pipe guides according to manufacturer's recommendations.

3.4 INSTALLATION OF REFRIGERANT PIPING SYSTEMS

A. Refrigerant piping equipment installation shall conform to the applicable requirements of the Safety Code for Mechanical Refrigeration (ANSI B9.1) and the Ohio Basic Building Code Article 4101:2-38.

B. Piping and specialties shall be sized to prevent excessive pressure drop, and allow compressors and evaporators to operate together with balance points at or above the specified capacities.

C. Piping and specialties shall be arranged to return oil at all loads, and prevent liquid from "slugging" the compressor or siphoning to the evaporator. Provide double suction risers and traps as required.

D. Pitch horizontal refrigerant piping 1/2 inch per 10 feet in direction of flow.

E. Provide separate refrigerant circuits for multiple compressor applications.

3.5 INSTALLATION OF AC CONDENSATE DRAIN PIPING

A. Equipment AC condensate drains shall be trapped as indicated on the Drawings or as required by the equipment manufacturer.

B. Piping draining by gravity shall be pitched be sloped at 1/4 inch per foot of run. Where conditions do not allow 1/4 inch per foot, piping shall be pitched at a minimum of 1/8 inch per foot of run.

C. Piping shall be installed to permit clearing of blockages and performance of maintenance without requiring the drain line to be cut. Provide cleanouts with threaded drain plug at each 90 degree change of direction and at 20 foot intervals in straight runs.

D. Piping shall be terminated with an air break as indicated on the Drawings.

3.6 CLEANING

A. Provide chemical cleaning for piping systems with an approved detergent to remove pipe dope, slushing compounds, oils, welding slag, loose mill scale and other extraneous materials. All flushing and cleaning shall be scheduled and documented. Include copy of flushing/cleaning report in the Operating and Maintenance Manual.

B. After initial period of operation clean all strainers, traps and dirt legs.

3.7 PIPING PRESSURE TESTS

A. All piping shall be given the following pressure test without pressure drop. Equipment which would be damaged by the required test pressure shall be isolated from the system during test.

B. Test medium for refrigerant piping shall be oil free pumped dry nitrogen. Twenty-four hour standing time minimum. Tests shall include both the high and low pressure sides of each system at not less that the lower of the design pressures or the setting of the pressure relief device(s). The design pressures for testing shall be those listed on the condensing unit, compressor or compressor unit nameplate, as required by ASHRAE 15. A dated declaration of test shall be provided for all systems containing 55 lb or more of refrigerant.

C. Correct minor leaks in welded joints by chipping out weld and rewelding. Correct leaks in screwed joints by replacing thread or fitting or both. Caulking of threaded joints is not permitted. Repair leaks in copper tubing by sweating out joints, thoroughly cleaning both tube and fitting, and resoldering.

D. Perform all tests before piping is concealed or covered.

E. Be responsible for completely draining the systems after hydrostatic tests are performed. Any damage from freezing prior to acceptance of the completed installation shall be repaired at no additional cost to the Owner.

F. All tests shall be scheduled and documented. Include copy of the piping system pressure test reports in the Operating and Maintenance Manual.

3.8 SYSTEM IDENTIFICATION

A. Pipe Markers

1. Identify each new pipe in Equipment Rooms, above accessible ceilings and in accessible shafts.
2. Markers shall be located:

    a. Adjacent to each valve.
    b. At each branch.
    c. At each cap for future.
    d. At each riser takeoff.
    e. At each pipe passage through wall (each side).

f. At each pipe passage 20' - 0" intervals maximum.
g. At each piece of equipment.
h. At all access doors.
i. A minimum of one (1) marker shall be provided at each room.

B. Valve Identification

1. Identify all valves with tags attached with chain. Local valves need not be tagged. All valves shall be designated by distinguishing numbers and letters carefully coordinated with a valve directory. All letter and number designations shall be coordinated with the Owner.
2. Designations and locations shall be accurately recorded on the Record Drawings.
3. At completion of project, provide a framed valve directory, under Plexiglass, giving number of valve , service, building location by column coordinates, floor location, manufacturer's figure number, size, and equipment controlled. For service, use designation shown in legend on drawings. Mount where directed by Owner.

END OF SECTION

SECTION 233000 - AIR DISTRIBUTION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Ductwork

B. Inserts, Hanger and Supports

C. Flexible Duct

D. Flexible Duct Connections

E. Ductwork Access Doors

F. Dampers and Deflectors

G. Grilles and Diffusers

H. Louvers

I. Gas Monitoring System

1.2 QUALITY ASSURANCE

A. Air Distribution System Cleanliness

1. The air distribution system shall be free of construction debris. New ductwork installation shall comply with this Specification and SMACNA Duct Cleanliness for New Construction Guidelines - Intermediate Duct Cleanliness Level.

   a. Protect ductwork and air distribution equipment stored on site and during delivery, from construction dust and debris and from moisture such as rainwater and building system leaks. Ductwork stored on the project site shall be stored off the ground, on wood pallets or blocks and covered with plastic or tarps to prevent from becoming covered with construction dust or debris prior to installation.
   b. The internal surfaces of ductwork and air distribution equipment shall be wiped to remove dust, immediately prior to installation.
   c. Installed ductwork and air distribution equipment shall be protected prior to air distribution system operation. All open ends of ductwork or openings to equipment shall be covered/sealed to prevent entry of dust and debris. This includes both completed systems and overnight work in progress.
   d. Protect ductwork and air distribution equipment with methods meeting the following minimum standards.

      1) Ductwork openings for ductwork installed or stored on site

         a) Plastic adhesive film: colored for easy identification on the project site. Thickness: minimum 2.5 mils. Tensile strength: minimum 11 pounds per inch.

b) Protective cover bag: colored for easy identification on the project site. Polypropylene plastic. Thickness: .002 mil. Elastic end band.

2) Air distribution equipment openings

a) Plastic coverings as described for ductwork.
b) Plywood or sheet metal with protective tape around edges.
c) Plastic shrink wrap.

3) Plastic garbage bags, grocery bags, scrap plastic sheeting, are not acceptable for use in protection of air distribution systems.

e. Remove all ductwork and air distribution equipment protection prior to equipment start up, testing, and balancing. Dispose of removed materials properly and remove from site.

2. If air distribution system is to be used during construction, comply with the following requirements:

a. Cover all outdoor air and return air openings to duct system with temporary construction filters. Filters shall be a minimum of MERV 8. Replace filters when dirty. At completion of construction, filters shall be removed.
b. In addition to filters specified on outdoor air and return air duct openings, provide specified pre-filters and final filters in air handling equipment. Replace periodically when dirty. Do not operate air handling equipment without specified pre-filters and final filters installed.
c. After construction is complete and before project turnover, provide new (clean) pre-filters and (clean) final filters in air handling units.

3. If ductwork and/or air distribution equipment become dirty or contaminated with construction dust, dirt, or debris, during delivery or installation, while stored or installed on site, or being operated during construction, equipment and/or ductwork shall be cleaned.

a. Cleaning to include air handling units, fans, ductwork, terminal units, coils, dampers, louvers, grilles and diffusers.
b. Contractor shall be a member of the National Air Duct Cleaners Association (NADCA) and certified by NADCA to perform Air Conveyance System (ACS) cleaning.
c. The standard of cleanliness shall be consistent with NADCA Standard ARC - 2013: Assessment, Cleaning and Restoration of HVAC Systems.
d. Interior of the entire air distribution system shall be cleaned using direct contact vacuum methods. Provide access openings at intervals that will enable the cleaning technician to maintain close contact with the surfaces being cleaned. Remote type vacuuming, air washing or cleaning methods utilizing hoses longer than can be visually observed from the point of insertion are not acceptable.
e. All access openings shall be closed with prefabricated sheet metal cover plates, fastened with sheet metal screws and caulked to prevent air leakage. Access openings cut into round ductwork shall be closed with Ductmate brand round access doors to ensure proper air tight enclosure. Any rigid or blanket type insulation removed to allow for installation of duct access openings shall be re-installed and seams covered and secured to eliminate any heat or cooling loss.

B. Duct Leakage Testing

1. The HVAC Contractor shall be responsible for sealing all ductwork and performing duct leakage testing in accordance with procedures described in Chapter 23 of AABC's National Standards, Sixth Edition, 2002. Allowable leakage shall not exceed 2% of design airflow in duct section being tested. Test pressure shall be equal to duct construction pressure. The following systems shall be tested:

   a. Supply ductwork
   b. Exhaust ductwork
   c. Return ductwork

2. All duct leakage testing shall be witnessed, and results verified by a certified AABC or NEBB test agency. Copies of the final results, as witnessed by the test agency, shall be included in the Operating and Maintenance Manual.
3. If any portion of the ductwork system fails the duct leakage test, the HVAC Contractor shall be responsible for correcting all deficiencies and providing additional testing until leakage is within acceptable limits.

1.3 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.4 CONSTRUCTION DOCUMENTATION

A. Refer to Section 230101.

B. Submit ductwork pressure test documentation upon completion of testing. Include final copies in the Operating and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 DUCTWORK

A. General Ductwork

1. Ductwork and plenum chambers shall be constructed to the gauge and corresponding reinforcing schedule as indicated in the latest edition of SMACNA Standards.
2. All ductwork shall be constructed of galvanized steel except where indicated to be of another material. Exposed ductwork in Architecturally finished spaces shall be fabricated G90 galvanized steel and thoroughly cleaned prior to painting.

B. Ductwork with a static pressure above 2-inches.

1. Round Ductwork

   a. Galvanized steel spiral conduit, lock seam construction.

1) Fittings, welded steel construction for tight slip fit with spiral. Provide connections from mains to branches or to flexible ducts with conical tee take-off.
2) All spiral ducts and fittings shall be as manufactured by United Sheet Metal Co., Semco or Lindab.

2. Rectangular Ductwork

a. Construct of galvanized steel of the U.S. standard gauge indicated in the latest edition of SMACNA Standards.

C. Air Duct Sealants

1. Air duct sealants shall conform to NFPA 90A, ASTM E84, ASTM E96, UL181A, and UL181B.
2. Acceptable manufacturers: Ductmate Industries, Inc. "Proseal" or "Fiberseal", RCD Corp. Provide all products in this section from a single manufacturer.
3. Air duct sealant: Ductmate Industries, Inc. "Proseal", water-based, 66% solids content, 11 lbs. per gallon, non-flammable, synthetic latex emulsion for permanently sealing fabricated joints and seams of sheet metal air ducts, UL 181 listed rigid fiberglass air ducts, UL181 listed flexible air ducts and thermal insulation; for repairing damaged and leaking air duct.
4. Air duct sealant where fiberglass reinforcement is required. Ductmate Industries, Inc. "Fiberseal", water-based, 66% solids content, 11 lbs. per gallon, non-flammable, synthetic latex emulsion with polypropylene fiber reinforcement for permanently sealing fabricated joints and seams of sheet metal air ducts, UL181 listed rigid fiberglass air ducts, UL181 listed flexible air ducts and thermal insulation; for repairing damaged and leaking air ducts.
5. Sealant application temperature: 35 degrees F to 110 degrees F; Sealant service temperature: -25 degrees F to 175 degrees F; Storage temperature: 40 degrees F to 85 degrees F.
6. VOC content of air duct sealants shall not exceed 10 grams per liter.

2.2 INSERTS, HANGERS AND SUPPORTS

A. Manufacturer: Basis of design shall be Anvil. Other acceptable manufacturers include Mason, Modern or Erico/Caddy.

B. Provide all inserts, hangers, anchors, guides and supports to properly support and retain ductwork and prevent sway and vibration.

C. Provide inserts for support of work in concrete construction.

D. Provide forged steel beam clamps when attaching to steel construction.

E. Provide supplementary steel angles, channels, and plates where supports are required between building structural members, span the space and attach to building structural members by welding, bolting or anchors.

F. Provide hangers, threaded rods, anchors, and all other miscellaneous specialties for the attachment of hangers and supports to structure.

1. For up to 3/4 inch diameter rod: Anvil Figure 92, 93, or 94 beam clamps.

2. For 7/8 inch and 1 inch diameter rod: Anvil Figure 134 beam clamp with Anvil Figure 290 eyenut.
3. Pressed steel beam clamps are not permitted.

G. Provide rods, angles, rails, struts, brace plates, and platforms required for suspension or support of ductwork.

H. Do not support ductwork from another pipe or ductwork. Do not support ductwork from conduit. Do not support ceiling framing or lighting from ductwork. Do not support any item from metal roof deck.

I. Support ductwork with 16 gage galvanized steel strap hangers, steel rods or steel trapeze hangers per SMACNA Standards. Maximum spacing 8'-0".

J. Where fireproofing is removed or damaged to allow attachment to building structural members, repair to maintain integrity of fireproofing.

2.3 FLEXIBLE DUCT

A. Type 1 - Insulated

1. Tested and classified by Underwriters Laboratories, Inc. as Class 1 Air Duct and labeled in accordance with Underwriters Laboratories, Inc. Standard for Air Ducts, UL 181. The flame spread rating shall be 25 or less and the smoke developed rating shall not exceed 50.
2. Flexible ductwork shall be rated for low or high pressure with a vapor transmittance of 0.05 perm per ASTM E96, Procedure A. Minimum positive pressure rating shall be 6" w.g. for sizes up to 12", and 4" w.g for size 14" and above. Minimum negative pressure rating shall be ¾" w.g for sizes up to 12", and ½" w.g for sizes 14" and above. Minimum rated air velocity of 5000 feet per minute.
3. Inner core construction shall be double or triple laminated, polyester, or Chlorinated polyethylene (CPE) that is permanently bonded to or encapsulating a steel wire helix. Outer jacket shall be made of fiberglass scrim reinforced metalized polyester.
4. Fiberglass insulation sleeve shall have minimum thermal resistance value of R-4.2. Flexible duct shall be manufactured with the following information printed on the exterior jacket: name of manufacturer, thermal resistance R-value at the specified thickness, flame spread and smoke development of the composite material.
5. Product shall carry a minimum 5 year limited warranty.
6. Manufacturer: Atco UPC #030, Flexmaster Type 5M, or Thermaflex Type M-KE.

B. Type 2 - Non-Insulated

1. Tested and classified by Underwriters Laboratories, Inc. as Class 1 Air Connector and labeled in accordance with Underwriters Laboratories, Inc. Standard for Air Ducts, UL 181. The flame spread rating shall be 25 or less and the smoke developed rating shall not exceed 50.
2. Flexible ductwork shall be rated for low or high pressure with a minimum positive pressure rating of 6" w.g. for all diameters. Minimum negative pressure rating shall be ¾" w.g for all diameters. Minimum rated air velocity of 5000 feet per minute.
3. Construction shall be double or triple laminated, metalized polyester that is permanently bonded to or encapsulating a steel wire helix.
4. Product shall carry a minimum 5 year limited warranty.

5. Manufacturer: Atco UPC #050, Flexmaster Type 5NI, or Thermaflex Type S-LD.

2.4 FLEXIBLE DUCT CONNECTIONS

A. Provide flexible connections with 1 inch slack between ducts and fans where indicated. Flexible material shall be Duro Dyne Metal Fab with "Grip Loc" metal to fabric seam.

B. Flexible fabric shall be UL classified black neoprene coated woven fiberglass (weight 30 oz/sq.yd.)

2.5 DUCTWORK ACCESS DOORS

A. Ductwork access doors shall be double wall with 1 inch thick insulation, latches, hinges and felt gaskets Cesco-Advanced Air model HADF-10, Ventlock, Duro Dyne or Ruskin.

B. Access door material and pressure classification shall match ductwork in which it is installed.

2.6 DAMPERS AND DEFLECTORS

A. Furnish and install all manual dampers, and deflectors where indicated or where necessary to properly distribute and balance air. Provide damper in each supply duct leaving duct main and in each branch serving individual supply, return and exhaust outlets and where otherwise indicated.

B. Dampers shall be fabricated with blades no larger than 8 inches wide by 48 inches long. Dampers over 48 inches in length shall have intermediate support and bearings.

C. Provide all manual dampers with Young Regulator Company, Ventlock or Duro Dyne operators. Use Young Regulator No. 443-B operators for balancing dampers. Opposite end of damper rod shall have Young Regulator No. 670 or 656 bearing set.

D. Where dampers are concealed above inaccessible ceilings or behind walls provide access doors.

E. Install additional dampers where required by the Air Balance Contractor to properly adjust the system air volumes.

2.7 GRILLES AND DIFFUSERS

A. See Drawings for all grille, diffuser and accessory specifications, locations and air quantity.

B. In general, Titus grilles and diffusers are specified, equals as manufactured by Anemostat, Krueger, E. H. Price Company, Tuttle and Bailey or Nailor-Hart are acceptable.

C. All grilles, registers and diffusers shall have a factory applied white finish unless noted otherwise.

D. Refer to Architectural Drawings for exact location of ceiling diffusers.

2.8 LOUVERS

A. Louvers shall be provided by the HVAC Contractor.

B. Louvers: 6 inch deep, stormproof, extruded aluminum, with 1/2 inch square mesh aluminum screen on interior face. Water penetration: 0.01 ounces of water per square foot of free area at a velocity of 875 FPM according to AMCA test. AMCA certified ratings for both water penetration and air performance.

C. Finish: Provide with the following finish: Kynar. Custom color to be selected by Architect.

D. Manufacturer: American Warming, Model LE-31, or equivalent by Airolite, Arrow or Ruskin.

2.9 GAS MONITORING SYSTEM

A. Provide a complete monitoring system package for muiltipoint vehicle exhaust monitoring.

B. Monitor Control Panel:

1. Micro-controller based design

2. Enclosure: Gray enameled 16 gauge steel with hinged door
3. Electrical: Hardwired 120 VAC, 60 Hz
4. Relays: 2 DPDT 10A @ 250 VAC Res.
5. Indicators: Red LED Alarm indicator, Yellow LED Warning indicator, Green LED Run indicator
6. User selectable options: Activation delays, five minutes for Waning and/or Alarm set points, minimum run timer, and audio alarm with Warning and/or Alarm set points.
7. Manufacturer: Armstrong Monitoring Model AMC-1AD1
8. Warranty: Two (2) years

C. Combination Carbon Monoxide (CO) and Nitrogen Dioxide (NO2) Sensors:

1. Electrochemical type sensor with a range of 0-100 ppm CO and 0-3 ppm NO2. Standard trip points are 25/100 ppm CO and 1/3 ppm NO2, but shall be field configurable. Sensor coverage area shall be fifty (50) foot radius.
2. Compatible with specified monitor control panel and shall be able to have eight (8) sensors able to be connected to a single monitoring zone.
3. Manufacturer: Armstrong Monitoring Model AMC-1222 or Engineer approved equal.
4. Warranty: Three (3) years

D. Provide complete system start-up from a manufacturer certified representative.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide all sheet metal work as indicated and according to the latest edition of the ASHRAE guide and data book, SMACNA standards and this specification, the most demanding of which shall be the minimum standard.

B. Install ductwork where indicated. Make all necessary changes in cross sections and offsets, whether or not specifically indicated.

C. All changes in cross section shall be made without reducing the design area of the duct.

D. Cap all open ends of ductwork until connected to grilles, diffusers, equipment to prevent entrance of debris, dust, etc.

E. No pipe or other obstructions shall pass through air ducts.

F. Install all ductwork run above ceiling so as to maintain design ceiling heights, ductwork run exposed shall be installed to provide maximum headroom in all rooms and corridors.

G. Locate ductwork a sufficient distance from walls, piping, other ductwork, other obstacles, to permit application of full thickness of insulation specified.

H. Ducts passing through exterior walls shall be provided with weatherproof flashings, ducts passing through roof shall be provided with roof curb and counter flashing. Where ducts pass exposed through interior building walls provide a sheet metal collar to conceal the gap between the wall opening and the duct.

I. Ducts shall not be hung from other ducts, pipe, conduit or from metal deck.

J. Duct dimensions are gross including dimensions for lined ducts where dimensions are outside sheet metal size.

K. Set all automatic air control dampers furnished by the Automatic Temperature Control Contractor.

L. All joints and seams in ducts shall be air-tight; poorly made joints, splits, visible holes at corners, etc., shall be reworked or new pieces of ductwork installed. Where excessive pulsating of ductwork or plenum housing is found, additional stiffeners shall be added. Any cracking in the coating around seams or joints, or in any other part of the formed ducts that is apparent upon inspection shall be sufficient to warrant rejection.

M. Sheet metal exposed to view through air distribution devices in finished areas of the building shall be coated with primer and a flat black finish coat.

N. Provide flexible duct connections at all fan inlets and outlets.

O. Size openings for ductwork penetrating non fire-rated walls and floor or ceilings so the opening is 1/2 to 3/4 inches larger than the duct or sleeve. Loosely stuff the annular opening with glass or mineral fiber, and caulk both sides with a non-aging, non-hardening acoustical sealant.

P. Provide ductwork access doors for each automatic damper, fire damper, fire/smoke damper, smoke damper, smoke detector, reheat coil inlet and outlet, humidifier and where indicated. Locate access doors to allow proper access to and inspection of the device.

3.2 DUCTWORK

A. General Ductwork

1. Ductwork shall be constructed per SMACNA Standard for the static pressure and seal class as follows:

System	Static Press.	Seal Class
Supply ductwork	2	A
Return ductwork	2	A
Exhaust ductwork	2	A

2. Radius elbow shall be utilized throughout the ductwork systems where possible and as shown on the Drawings. Do not substitute 90° mitered elbows with turning vanes unless specifically shown on the Drawings or without prior approval of the Engineer.
3. Branch connections shall be 45 degree entry for rectangular and round ducts. Straight taps are not permitted. Conical tees are acceptable in round branch take-off from round duct mains.
4. Seal all seams, joints, fasteners, penetrations and connections per SMACNA requirements.

3.3 FLEXIBLE DUCT

A. Flexible duct shall only be used in non-visible locations above a ceiling. Type shall be as follows:

1. Type 1: Supply air connections to diffusers and air terminal unit inlets.
2. Type 2: Return and exhaust air connections to grilles.

B. Flexible duct shall not be used where ductwork is exposed (visible). Flexible duct shall not penetrate through walls or floors - rigid sheetmetal ductwork is required at all wall or floor penetrations. Flexible duct shall not be installed in chases.

C. Install flexible duct per manufacturer's recommendations.

D. The minimum length of flexible duct shall be used. Install flexible duct fully extended free of sags and properly supported to avoid any kinks or airflow restrictions. Support with 3 inch wide saddle type supports as manufactured by Thermo Manufacturing Inc. Do not lay unsupported on ceiling tiles.

E. Secure flexible duct in place with duct adhesive and plastic band using banding tool supplied by manufacturer. Adhesive shall be RCD No. 8, Duro Dyne "DSW" or MEI ECC EZ Seal 44-41. Adhesive must be compatible with flexible duct material. Where insulated flexible duct is used, insulation vapor barrier shall be taped in place tight to duct collar connections with two (2) complete wraps of duct tape.

F. Maximum length of flexible duct connections to diffusers and grilles shall be 60 inches. Bends shall be made with not less than one duct diameter centerline radius.

3.4 LOUVERS

A. Install louver plumb in opening. Seal edges air and water tight with silicon caulk matching louver or brick color.

B. Insulate unused, interior portions of louvers with 1 inch thick polyisocyanurate (R= 6.0 minimum) cover exterior and interior sides of insulation with 20 gauge galvanized sheetmetal with stainless steel fasteners.

END OF SECTION

SECTION 233400 – FANS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. In-Line Centrifugal Fans

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 IN-LINE CENTRIFUGAL FANS (IC)

A. Fans shall be of the centrifugal direct driven in-line type of model, size and capacity scheduled.

B. The fan housing shall be of the square design constructed of heavy gauge steel and shall include square duct mounting collars. Steel components coated with primer and enamel finish coat.

C. Fan construction shall include removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.

D. The fan wheel shall be centrifugal backward inclined, constructed of aluminum, and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.

E. Motors shall be heavy duty ball bearing type furnished at the specified voltage, phase and enclosure. Motors shall be electronically commutated type. Motors and drives shall be mounted out of the airstream. Motors shall be readily accessible for maintenance.

F. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L50) life in excess of 200,000 hours at maximum cataloged operating speed.

G. All fans shall bear the AMCA Certified Ratings Seals for both sound and air performance.

H. Provide fan with accessories as scheduled.

I. Acceptable manufacturers: Acme, Greenheck, Loren Cook and Twin City Fans.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fans as indicated, and in accordance with manufacturer's installation instructions. Support fans from building structure, do not support from adjacent ductwork. Provide vibration isolation as indicated elsewhere in the specifications.

B. Install each fan level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer

C. Make ductwork connections to fans with flexible connections.

3.2 START-UP

A. Prior to start-up, verify electrical connection for correct voltage.

B. After startup, verify fan rotation.

END OF SECTION

SECTION 235100 – FLUES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Flues

B. Combustion Air Intakes

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. Submit fabrication drawings for flues and combustion air intakes indicating layout, fittings, reinforcing, elevations and configuration.

1.3 QUALITY ASSURANCE

A. Where applicable, products furnished under this section shall conform to the requirements of the following:

1. International Fuel Gas Code
2. NFPA 54 - National Fuel Gas Code
3. NFPA 211 - Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances

PART 2 - PRODUCTS

2.1 PVC IS NOT ACCEPTABLE

A. Use of PVC pipe is NOT acceptable for flues or combustion air intakes even if approved by equipment manufacturer for use.

2.2 FLUES

A. Double Wall Insulated Vent

1. Flue Category I & III.
2. Maximum continuous flue gas temperature shall not exceed 500°F.
3. Double wall, insulated with a 304 stainless steel inner wall and 304 stainless steel outer wall, complying with UL 103, Standard for Safety, Factory-Built Chimneys for Residential and Building Heating Appliances.
4. 1 inch ceramic fiber insulation.
5. Provide all pipe, fittings, stack cap, ventilated roof thimble, drain section, flashing collar, supports, expansion joints etc. required for a complete installation.
6. Acceptable manufacturers: Selkirk Metalbestos IPSC, Metal-Fab IPIC or Van Packer DWplus.

B. Polypropylene Flue System

1. Flue Category II & IV.
2. Maximum continuous flue gas temperature shall not exceed 230°F.
3. System shall be certified to UL-1738 Standard for Venting Systems for Gas-Burning Appliances.
4. System shall be installed per manufacturer¢s installation instructions.

    a. Polypropylene exposed to sunlight shall be U.V. stabilized.
    b. Flexible flue can be sloped a maximum of 45° from vertical unless stated otherwise in manufacturer¢s installation instructions.
    c. Install test port immediately above appliance or appliance adaptor.

5. System from appliance to exterior of building shall be by a single manufacturer.
6. Provide all pipe, fittings, supports, etc. required for a complete installation.
7. Acceptable manufacturer: Centrotherm - InnoFlue.

2.3 COMBUSTION AIR INTAKES

A. Type-B Gas Vent

1. Double wall air insulated with aluminum alloy inner wall and galvanized steel outer wall, complying with UL 441, Gas Vents.
2. Provide all pipe, fittings, stack cap, flashing collars, supports, etc. required for a complete installation.
3. Acceptable manufacturers: Selkirk Metalbestos, Metal-Fab or Van Packer.

B. Polypropylene

1. System shall be installed per manufacturer¢s installation instructions.

    a. Polypropylene exposed to sunlight shall be U.V. stabilized.

2. System from appliance to exterior of building shall be by a single manufacturer.
3. System shall be certified to UL-1738 Standard for Venting Systems for Gas-Burning Appliances.
4. Provide all pipe, fittings, supports, etc. required for a complete installation.
5. Acceptable manufacturer: Centrotherm - InnoFlue.

2.4 DRAIN PIPING

A. Non-Condensing Type Appliances

1. Schedule 40 black steel (ASTM A53) with 125 PSIG, black cast iron screwed fittings.

B. Condensing Type Appliances

1. Schedule 80 Chlorinated Polyvinyl Chloride (ASTM F441), 210 degrees F temperature limit with CPVC solvent -weld socket type fittings (ASTM F439). Provide adaptors for connection to appliance as required.

PART 3 - EXECUTION

3.1 GENERAL

A. Use of PVC pipe is NOT acceptable for flues or combustion air intakes. If installed, the Mechanical Contractor is responsible for the removal and disposal of the PVC materials and for the installation of the flue and/or combustion air materials listed in this specification at no additional cost to the Owner.

B. All products shall be installed in accordance with listing NFPA, International Fuel Gas Code and the manufacturer's recommendations.

C. Store delivered materials inside, out of weather. Protect material from accidental damage or vandalism.

D. Install all materials with adequate allowance for expansion to prevent damage including damage to building and equipment. Provide anchors, guides and expansion joints for complete control of movement.

E. Flue and combustion air intake sizes indicated on the Drawings are based on the requirements of scheduled equipment which is the Basis of Design. If the Mechanical Contractor uses equipment, other than the Basis of Design, it is the Mechanical Contractor's responsibility to confirm flue and combustion air intake sizes based on the submitted equipment manufacturer¢s requirements prior to installation. If an increase in size is required, the Mechanical Contractor is responsible for this size increase including modifications to any adjacent systems and/or building modifications to create additional space. The Mechanical Contractor is responsible for the revised design and construction including the costs of all associated trades involved.

3.2 FLUES

A. Assemble polypropylene flue systems with manufacturer's connector system. Assemble metal vent type flues with factory joints.

B. All flues shall be securely supported from building construction. Metal vent type flues shall be supported by galvanized strap iron. Maintain code required clearances to combustible materials. Non-metal type flues shall be supported by hangers per Specification Section 232000. Maximum horizontal spacing for polypropylene flues is 39", maximum vertical spacing is 78".

C. Flues passing through exterior walls shall be provided with weatherproof flashings. Flues passing through roof shall be provided with weatherproof flashing and counter flashing collar. Where flues pass exposed through interior building walls provide a sheet metal collar to conceal the gap between the wall opening and the flue. Maintain code required clearances to combustible materials.

D. Cap all open ends of flues until installation is complete to prevent entrance of debris, dust, etc.

E. For non-condensing type appliances, where indicated, provide tee with drain at the base of each vertical flue. For condensing type appliances, provide drain piping as indicated - drain piping shall be installed per appliance manufacturer''s recommendations. Terminate drain at floor drain with air gap.

F. Install and slope flues in accordance with appliance manufacturer's recommendations.

G. Flue Schedule: Equipment - Flue Type

1. Gas Unit Heater and Gas Radiant Heater - Double Wall Insulated Vent
2. Domestic Water Heater and Furnace - Polypropylene Flue System

3.3 COMBUSTION AIR INTAKES

A. Assemble polypropylene intakes with manufacturer's connector system. Assemble metal vent type intakes with factory joints.

B. All intakes shall be securely supported from building construction. Metal vent type intakes shall be supported by galvanized strap iron. Non-metal type intakes shall be supported by hangers per Specification Section 232000. Maximum horizontal spacing for polypropylene flues is 39", maximum vertical spacing is 78".

C. Intakes passing through exterior walls shall be provided with weatherproof flashings. Intakes passing through roof shall be provided with weatherproof flashing and counter flashing collar. Where intakes pass exposed through interior building walls provide a sheet metal collar to conceal the gap between the wall opening and the intake.

D. Cap all open ends of intakes until installation is complete to prevent entrance of debris, dust, etc.

E. Install and slope intakes in accordance with appliance manufacturer’s recommendations.

F. Combustion Air Intake Schedule: Equipment - Intake Type

1. Gas Unit Heater and Gas Radiant Heater - Type B Gas Vent
2. Domestic Water Heater and Furnace - Polypropylene

END OF SECTION

SECTION 235400 - GAS FIRED FURNACES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Gas-Fired Furnaces

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 QUALITY ASSURANCE

A. The units shall be designed, tested, adn constructed to the current ASI Z21.47/CSA 2.3 design standard for gas-fired central furnaces.

B. Unit will be third party certified by CSA to the current ANSI Z21.47/CSA 2.3 design standard for gas-fired central furnaces. Unit will carry the CSA Blue StarR and Blue FlameR labels. Unit efficiency testing will be performed per the current DOE test procedure as listed in the Federal Register.

C. Unit will be certified for capacity and efficiency and listed in the latest AHRI Consumer’s Directory of Certified Efficiency Ratings.

D. Unit will carry the current Federal Trade Commission Energy Guide efficiency label.

1.4 WARRANTY

A. The units shall have a manufacturer's parts and defects warranty for a period of two (2) years from date of installation. The primary and secondary heat exchangers shall have a warranty of ten (10) years from the date of installation.

PART 2 - PRODUCTS

2.1 GAS-FIRED FURNACES

A. Provide natural gas-fired furnace of type, size, configuration and with accessories as indicated on the drawings.

B. Casing shall be of .030 in. thickness minimum, pre-painted steel.

C. Primary heat exchangers shall be 3-pass corrosion-resistant aluminized steel of fold-and-crimp sectional design and applied operating under negative pressure.

D. Secondary heat exchangers shall be of a stainless steel flow-through of fin-and-tube design and applied operating under negative pressure.

E. Draft inducer motor shall be two-speed PSC design.

F. Galvanized blower wheel shall be centrifugal type, statically and dynamically balanced. Blower motor of electronically commutated type shall be permanently lubrivated with sealed ball bearings and have infinitely variable speed from 600 to 1200 RPM operating only when motor inputs are provided. Blower motor shall be direct drive and soft mounted to the blower housing to reduce vibration transmission.

G. Controls shall include a micro-processor-based integrated electronic control board with at least 16 service troubleshooting codes displayed via diagnostic flashing LED light on the control, a self-test feature that checks all major functions of the furnace, and a replaceable automotive-type circuit protection fuse. Multiple operational settings available, including separate blower speeds for constant volume airflow delivery at low heat, high heat, low cooling, high cooling and continuous fan. Continuous fan speed may be adjusted from the thermostat. Features will also include temporary reduced airflow in the cooling mode for improved dehumidification.

H. Accessories

1. Condensate acid neutralization kit.
2. MERV 13 filter with associated filter cabinet for field mounting in return duct beside furnace.

I. Manufacturer: Carrier or equivalent by Daikin, Trane, or York.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install heaters as indicated, and in accordance with manufacturer's installation instructions. Support units from building structure utilizing manufacturer¢s standard mounting hardware.

B. Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Provide flues and combustion air intakes and terminate in accordance with manufacturer’s installation instructions.

D. Provide control wiring between furnace and associated outdoor condensing unit.

E. Coordinate gas piping connection requirements with the Plumbing Contractor. Make piping connections to units to allow normal service and maintenance. Provide union connections to permit unit removal.

F. Coordinate clearance to combustibles in accordance with manufacturer's requirements.

END OF SECTION

SECTION 235500 - FUEL FIRED HEATERS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Gas-Fired Unit Heaters

B. Gas-Fired Radiant Heaters

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 GAS-FIRED HORIZONTAL UNIT HEATERS

A. Provide separated combustion gas-fired horizontal unit heaters of type, size and configuration indicated and with the following features and accessories.

B. Die-formed steel casing with baked enamel finish. Heat exchanger and burner constructed of aluminized steel. Single-speed propeller type fan. Totally enclosed motor with built-in thermal overload protection and equipped with a safety fan guard.

C. Include the following controls: Combination automatic two-stage gas valve and spark ignition controller, overheat control, low voltage transformer, fan timer, lockout timer and an intermittent pilot with 100 percent safety shut-off. Provide unitmounted thermostat..

D. Manufacturer: Reznor UDZ or equivalent by Modine or Engineer approved equal.

2.2 GAS-FIRED RADIANT HEATER

A. Provide gas-fired infrared heaters of type, size and configuration indicated and with the following features and accessories.

B. Natural Gas burner. Enclosed box with gasketed doors and internally mounted blower. Factory outside air adaptor collar for sealed combustion. Door interlocksafety switch. Stainless steel flex gas line, and high pressure gas shut-off assembly.

C. Burner tube to be Aluminized steel tube for the first 10ft of each heater. Remaining shall be heat treated aluminized tube.

D. Reflector to be Stainless Steel and shall include side extension where noted on plans and/or Heater schedule.

E. Include the following controls: Burners factory wired for 120V/1PH operation, single stage gas valve, combustion air blower and control for burner operation. System shall include a programmable thermostat.

F. Manufacturer: Roberts Gordon Model GordonRay BH, or equivalent from Re-Verber-Ray or Space Ray.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install heaters as indicated, and in accordance with manufacturer's installation instructions. Support units from building structure utilizing manufacturer’s standard mounting hardware.

B. Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Provide flues and combustion air intakes and terminate in accordance with manufacturer’s installation instructions.

D. Coordinate gas piping connection requirements with the Plumbing Contractor. Make piping connections to units to allow normal service and maintenance. Provide union connections to permit unit removal.

E. Coordinate clearance to combustibles in accordance with manufacturer's requirements.

END OF SECTION

SECTION 238113 - PACKAGED TERMINAL AIR CONDITIONERS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Packaged Terminal Air Conditioners (Heat Pump)

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 PACKAGED TERMINAL AIR CONDITIONERS (HEAT PUMP)

A. Provide heat pump packaged terminal air conditioners of type, size, and configuration indicated and with the following features and accessories.

B. Casing: Constructed on 18 gauge galvanized steel with zinc coated interior surfaces and baked on enamel exterior finish. Provide removable panels or access doors for inspection and access to internal parts. Insulate casing and compressor compartment with ½ inch thick minimum insulation. Provide knockouts for electrical connections.

C. Compressors: Furnish with welded shell, hermetic compressors, mounted on rubber isolators.

D. Evaporator and Condenser Coil: Construct of copper tubing and aluminum fins.

E. Fans: Dual fan motors for evaporator and condenser fans. Motor types shall be high efficiency, permanent split capacitor type, outdoor fan removes condensate from drain pan into the outdoor air coil.

F. Filters: Provide 1 inch thick washable filters.

G. Outside Air Damper: Two position with control lever located in unit behind front panel. Provide with power door kit to allow outdoor air damper to auto open when fan is on.

H. Electric Heating Coil: Nichrome coiled elements each protected by fusible link and overheat limit control.

I. Controls: Remotely mounted thermostat hard-wried to PTAC for power and communication.

J. Exterior Grille: Horizontal louver architectural type grilled of aluminum construction. Factory painted of manufacturer's standard color as selected by the Architect.

K. Subbase: For frontal support with leveling legs.

L. Accessories:

1. External condensate drain kit.
2. Insulated wall sleeve
3. Corrosion Resistance: Compressor and condenser section are coated with a corrosion resistant finish.
4. Electrical sub-base with fused disconnect switch, for hard-wired power connection. Wiring entru through bottom of sub-base.

M. Manufacturer: Amana Model PTH, or equivalent by Trane or Daikin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units as indicated, and in accordance with manufacturer's installation instructions.

B. Install each unit level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Prior to project turnover, units shall be cleaned and new filters installed.

END OF SECTION

SECTION 238126 - SPLIT SYSTEM AIR CONDITIONERS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Outdoor Condensing Unit

B. Indoor Cooling Coil

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 QUALITY ASSURANCE

A. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.

B. All wiring shall be in accordance with the National Electrical Code (N.E.C.) and local codes as required.

C. The units shall be rated in accordance with AHRI Standard 210 and bear the ARI Certification Label.

D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

1.4 WARRANTY

A. The units shall have a manufacturer's parts and defects warranty for a period of 5 years from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. This warranty does not include labor.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide split system air conditioning unit of type, size and configuration indicated and with the following features and accessories.

B. System shall consist of an outdoor condensing unit with a matched capacity indoor cooling coil.

2.2 OUTDOOR CONDENSING UNIT

A. Cabinet casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection.

B. Condenser fan will be direct-drive propellar type, discharging air upward. Condenser fan motors will be totally enclosed, 1-phase type with class B insulation and permanently lubricated bearings. Shafts will be corrosion resistant. Fan blades will be statically and dynamically balanced. Condenser fan openings will be equipped with coated steel wire safety guards.

C. The condenser coil shall be of copper tubing with flat copper fins to reduce debris build up and allow maximum airflow. The coil shall be protected with integral metal guards.

D. Compressor shall be hermetically sealed with internal overload protection and mounted on rubber vibration isolators..

E. Refrigeration components will include liquid-line and vapor-line shut-off valves with system charge of R-410A refrigerant. Provided with low pressure switch and filter drier.

F. Unit electrical power shall be single point connection.

G. Unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operational functions.

H. Unit shall be completely factory assembled, piped, wired and test run at the factory.

2.3 INDOOR COOLING COIL

A. Coil shall be designed to be compatible with specified gas-fired furnace.

B. The N-shape evaporator coil shall be of nonferrous construction with pre-coated aluminum fins on copper tubing. The coils shall be pressure tested at the factory. Shall meet or exceed burst pressure of 2100 psi.

C. Painted case with factory-installed thermostatic expansion valve.

D. Corrosion-resistant condensate drain pan designed with a slope to the drain outlet.

2.4 MANUFACTURERS

A. Manufacturers: Carrier or equivalent by Daikin, Trane, or York.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install indoor and outdoor units as indicated, and in accordance with manufacturer's installation instructions.

B. Install unit's level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Connect refrigerant piping to units including installation of field mounted accessories.

D. Coordinate electrical connection requirements with Electrical Contractor. Power to the indoor unit shall be supplied by the outdoor unit.

E. Provide control wiring between indoor and outdoor unit.

F. Testing: Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

G. Start-up units, in accordance with manufacturer's start-up instructions. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

END OF SECTION

SECTION 238203 – ELECTRIC HEATING UNITS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Electric Unit Heaters

1.2 SUBMITTALS

A. Refer to Section 230100 and 23 01 01 for additional information.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 ELECTRIC UNIT HEATERS:

A. Provide electric unit heaters of type, size and configuration indicated and with the following features and accessories.

B. Heavy gauge steel casing with baked enamel finish. Provide hanger with drilled or threaded connections. Steel-sheathed heating element with built-in automatic reset high limit switch. Continuous duty motor directly connected to fan. Fan shall be statically and dynamically balanced. Discharge louver shall be fully adjustable. Controls shall be factory mounted and include fan delay relay, operating contactor, and unit mounted thermostat.

C. Heater shall be suitable for installation with wall/ceiling bracket or four corner support brackets, furnished with the heater.

D. Manufacturer: Q-Mark MUH or equivalent by Brasch, Raywall, Markel, Electromode or Indeeco.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install heaters as indicated, and in accordance with manufacturer's installation instructions.

B. Install each heater level and accurately in position indicated in relation to other work; and maintain sufficient clearance for normal service and maintenance, but in no case less than that recommended by manufacturer.

C. Unit Heaters: Support from wall or ceiling utilizing factory furnished wall/ceiling bracket or corner support brackets.

D. Coordinate electrical connection requirements with Electrical Contractor.

END OF SECTION

SECTION 260100 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to this Division's Supplemental General Provisions for additional Project requirements.

B. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates and Addenda are a part of this Specification. Contractors and Subcontractors shall examine these provisions as they may affect work under this Division.

C. Contractor shall examine Division 1 Contract Documents for general project requirements.

D. Contractor shall also examine the Contract Documents of all Divisions which may affect and require work under this Division and be responsible for all work required under this Division.

1.2 DESCRIPTION OF WORK

A. This project involves work in an existing operating facility and will require close communication with Owner with regard to access and work hours. Coordinate all work schedules prior to bidding with Owner. When project includes a Construction Manager, all work schedules shall also be coordinated with the Construction Manager, prior to bidding.

B. All Drawings as well as the Specifications for all Divisions shall be defined as the Contract Documents. Contractor shall review entire set of Contract Documents prior to bidding.

C. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both the Specifications and the Drawings.

D. Prior to submitting bid, Contractor shall examine all Drawings and Specifications to develop a complete understanding of the project scope. Contractor shall ask for clarifications during the pre-bid phase of the project. Failure to do so will not relieve the Contractor of their responsibility to perform all required work.

E. Where the project scope involves renovations and additions, it is required that Contractors visit the site of the work and become familiar with the conditions affecting the installation. Submission of a Bid shall presuppose knowledge of such conditions and no additional compensation shall be allowed where extra labor or materials are required because of the lack of knowledge of these conditions.

F. Bid shall include any special phasing requirements related to the construction work as described in the Contract Documents. Coordinate with Division 1.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation shall be considered applicable. In the event that such interferences occur in course of the work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences that may occur during the course of construction shall be brought to the immediate attention of the Architect and Engineer, and the Architect and Engineer's decision, confirmed in writing, shall be final.

H. The following general terms as used within the context of the Contract Documents shall be defined as follows:

1. "Contract Documents" - The complete set of Drawings and Specifications for all Divisions included in the project.
2. "Drawings" - Drawings furnished as part of the Contract Documents.
3. "Contractor" - This Division's Contractor and the Subcontractors to this Division's Contractor.
4. "Responsible" - To perform work required.
5. "Furnish" - To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" - Work which includes the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" - To furnish and install, complete and ready for the intended use.
8. "Equal" - To meet or exceed the standards of the specified products or listed manufacturers.
9. "Mechanical" - HVAC, Plumbing and Fire Protection Divisions as applicable.

1.3 WORK INCLUDES

A. Include all labor, material, equipment, services, coordination, supervision and administration necessary for the proper completion of all work shown. Items omitted, but necessary, to make all systems complete and workable shall be understood to form part of the work.

B. Material for work required to complete installation such as earthwork, concrete, masonry, mortar, reinforcing steel, patching and painting shall be provided as specified in other applicable Divisions covering such work.

C. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Include all testing, test reports, system programming, start-up reports and warranties for each system as outlined elsewhere in these Specifications. Refer to "Operating and Maintenance Manuals" for additional requirements.

1.4 ALTERNATES

A. Refer to this Division's Supplemental General Provisions for a description of alternates.

1.5 PERMITS AND FEES

A. Secure and pay for permits and inspections required for all work related to this Division. Turn over certificates of approval to the Owner or Construction Manager promptly when received, and before payment is made for the work.

B. Give proper authorities notice as required by law relative to the work in their charge. Comply with the regulations regarding temporary enclosures, obstructions or excavations and pay all legal fees involved.

1.6 QUALITY ASSURANCE

A. Work shall be installed in accordance with provisions of all applicable codes, as interpreted by the local Authority Having Jurisdiction (AHJ), as well as any further modifications or regulations published by local or State Authorities.

B. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

C. The following building codes with amendments shall be followed:

1. Ohio Building Code
2. Ohio Fire Code

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Testing and Material (ASTM)
3. Americans with Disabilities Act (ADA) - Americans with Disabilities Act Accessibility Guidelines (ADAAG)
4. Federal Occupational Safety and Health Act (OSHA)
5. NFPA Standards as referenced by the Building Codes.
6. Authority having jurisdiction

1.7 ELECTRONIC MEDIA

A. Electronic drawing files are available to the Contractor from the Engineer for coordination purposes as defined in Division 0 and Division 1.

B. Contractor shall deliver closeout documents on a portable memory device. Portable memory device shall refer to CD, DVD, Flash Drive, external hard drive or any other portable media used for storing electronic files.

1.8 SUBMITTALS

A. Conform to submittal requirements outlined in Division 1 Specifications. Provide Submittals in an electronic format. The file format shall be portable data file (.pdf).

B. Submittal transmittal shall list corresponding Specification Section and a description of item(s) being submitted. Each submittal shall only include items from one Specification Section. Submittals which include items from multiple specification sections will be returned "REVISE AND RESUBMIT."

C. Prepare Submittals with adequate details and dimensions as necessary to clearly show construction. Clearly identify each item on the submittal with designation as indicated on Drawings including location and use. Include with Submittals Manufacturers published descriptive literature, specifications, performance data (normal operating characteristics, curves, ratings, etc.), wiring diagrams and installation instructions. Indicate for each item the operating characteristics, design conditions, features, and optional items that are intended for application on this project. Where contents of Submittal literature include data not pertinent to the Submittal, clearly indicate (highlight) which portion of content is being submitted for review.

D. Contract Documents include scheduled equipment which is the Basis of Design and used to establish design and space requirements. Contract Documents may also include alternative acceptable manufacturers. Where alternative manufacturer's equipment is submitted which alters the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with deviations from the Basis of Design shall be borne by the Owner.

E. If for any reason, the Submittal shows variations from the requirements of the Contract Documents, the Contractor shall make mention of such variation in the letter of transmittal. The Contractor shall note in red on the Submittal any change in design or dimension on the items submitted including changes made by the Manufacturer which may differ from catalog information.

F. Where additional installation drawings, wiring diagrams or other drawings are specified elsewhere as part of the project requirements, they shall be submitted at the same time as the Submittals. Partial Submittals are not acceptable.

G. Contractor shall review each Submittal prior to submission, and check for compliance with the Contract Documents. Corrections shall be noted. Mark with approval stamp prior to submission. Submittals that do not bear the Contractor's approval stamp will be returned without action.

H. The Submittals will be reviewed only for General compliance and not for dimensions, quantities, etc. The responsibility of correct procurement remains solely with the Contractor. The Submittal review shall not relieve the Contractor of responsibility for errors or omissions and deviations from the Contract Document requirements. Submittals which are not required under this Division shall be returned to the Contractor.

I. Where Submittal review format, whether hard copy or software based, includes pre-determined language that includes the word "Approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" or similar verbiage shall be defined as "Reviewed, Exceptions as Noted".

J. After review of submittals by the Engineer, the Contractor shall revise and resubmit if required to establish compliance with the Contract Document requirements. Resubmittal shall include a document with a written response to each of the Engineer's previous comments.

K. The Contractor shall notify the Engineer when all product data and/or shop drawings for all equipment, materials and systems have been submitted for review.

L. The Contractor agrees that Submittals, processed by the Engineer, are not change orders; that the purpose of submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design intent of the project. This understanding is demonstrated by indicating which equipment and material is required, and by what methods of fabrication and installation will be utilized.

M. The Contractor further agrees that if deviations, discrepancies or conflicts between the Submittals and the Contract Documents are discovered, either prior to or after Submittals are processed by the Engineer, the Drawings and Specifications shall control and shall be followed.

N. Final reviewed submittals shall be included in the Operating and Maintenance Manuals. Where Submittals are returned "REVIEWED, EXCEPTIONS AS NOTED", the final Submittals shall be updated to include the exceptions. Upon ordering equipment, order sufficient number of sets of product data literature for the Operating and Maintenance Manuals.

1.9 GUARANTEE AND WARRANTIES

A. Warrant that equipment and all work is installed in accordance with good workmanship practice. All equipment shall be installed in accordance with the Manufacturer's recommendations and shall meet the requirements specified. Any equipment failing to perform or function as specified shall be replaced with complying equipment without cost to the Owner. Warranty shall commence upon acceptance of substantial completion of construction by the Owner. Sign-off of individual equipment start-up procedures shall not activate the warranty commencement.

B. Guarantee against defects in workmanship and materials; repair or replace any defective work, material or equipment within one year from date of formal written warranty commencement. Longer product warranties provided by individual equipment manufacturers shall supersede this one year guarantee; however, the Contractor shall maintain the one year workmanship and materials guarantee for installation of such equipment. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall consist of marked-up Drawings as defined elsewhere in the Specifications. Refer to Division 1 for quantities, special formatting, and additional requirements.

2. The Contractor shall keep one complete set of the original Drawings on the project site on which shall be recorded any deviations or changes from such Drawings made during construction. These drawings shall become the Record Drawings, shall be kept clean and undamaged, and shall not be used for any other purpose other than recording deviations from the original Drawings. At the end of the project, the Contractor shall make electronic .pdfs of these drawings and transfer them onto a portable memory device. Both hard copy drawings and the portable memory device shall be provided as Record Drawings.
3. After the project is completed, the Record Drawings shall be delivered to the Architect/Engineer for inclusion into the Operating and Maintenance Manuals, as a permanent record of the installation as constructed.

1.11 SITE REPORTS AND PUNCHLISTS

A. The Engineer may visit the site periodically during construction and provide written Construction Observation Reports to the Contractor identifying areas where installation does not meet the intent of the Contract Documents. The Contractor shall provide a written response to these reports within 5 business days, indicating the reason the installation is out of compliance with the Contract Documents. After review, the Engineer may or may not require the Contractor to correct the installation. The Contractor shall correct the installation unless the reason for non-compliance is accepted, in writing, by the Engineer or Owner.

B. Final Punch List

1. The Engineer will visit the site to perform a scheduled Final Punch List to identify areas where the installation is incomplete or does not meet the intent of the Contract Documents.
2. If the Engineer is requested to perform the Final Punch List prior to the Contractor being 100% complete with their scope of work, the Contractor shall furnish a Contractor's Completion List, indicating all incomplete work. This list shall be furnished to the Engineer a minimum of 24 hours prior to the scheduled Final Punch List.
3. The Contractor shall respond to each punch list item along with a date, indicating that the item has been completed or corrected.
4. A copy of the Final Punch List with the Contractor's responses shall be included on the Operating and Maintenance Manual.

C. Where on-line documentation management services or project management software requires the author/initiator of a corrective action to close it, and the Engineer is the author/initiator, the following shall apply:

1. When the corrective action is reported as corrected/complete, by either the responsible Contractor or the Construction Manager, the Engineer will assume that the parties responsible for construction have reviewed and approved the correction.
2. By closing the corrective action, the Engineer is in no way approving nor assuming responsibility for the installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials used on this project shall be new and listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, etc.or as approved by the local Authority Having Jurisdiction. Equipment and materials shall be installed or used in accordance with instructions included with the listing or labeling. Where possible, the same brand or manufacturer shall be used for each type of material or equipment. such as.

B. Equipment and materials for the construction shall be the responsibility of the Contractor and shall be protected by the Contractor until formally accepted by the Owner.

C. All Manufacturers of equipment shall verify to the satisfaction of the Contractor and Engineer that their equipment will function properly under the conditions of use, as shown on the Drawings and as specified herein. Dimensions, weights, operating characteristics and all other related appurtenances shall be verified before submittal of shop drawings.

2.2 MATERIAL SUBSTITUTIONS

A. Bids shall be based upon the specified products, suppliers or listed alternatives. The Drawings and Specifications are based on the products specified by type, model, size and suppliers if indicated and thus establish minimum qualities which substitutes must meet to qualify for review.

B. Should the Contractor propose to furnish materials, equipment and/or suppliers other than those specified, submit a written request for substitutions to the Architect or Engineer in accordance with Division 1 requirements. The request shall be an alternate to the original Bid and shall be accompanied with complete descriptive (manufacturer, brand name, catalog number, supplier name and references, etc.) and technical data for all items. Indicate any additions or deductions to the base Bid price.

C. Where substitutions alter the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with the use of a substitution shall be borne by the Owner.

D. Acceptance or rejection of the proposed substitutions shall be subject to approval of the Architect or Engineer. If requested, the Contractor shall submit inspection samples of both the specified and the proposed substitute items for review.

E. In all cases where substitutions are permitted, the Contractor shall bear any and all extra cost of evaluating the equality of the material and equipment to be installed.

F. Where only one Manufacturer or supplier is named in the Contract Documents, the system or equipment shall be provided as specified.

G. Verbal requests or approvals of substitutions shall not be binding on the Architect, Engineer or Owner.

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall follow all safety requirements as defined herein, as described in Division 1 and as defined by Owner safety protocols.

B. Work shall be performed on de-energized equipment in accordance with NFPA 70E.

C. Should suspected hazardous materials be encountered, Contractor shall adhere to procedures, methods and regulations of the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) and immediately notify Owner.

3.2 COORDINATION

A. Take all field measurements necessary and assume responsibility for the accuracy.

B. If any work is fabricated or assembled off-site, assume responsibility for the accuracy of such pre-manufactured assemblies.

C. Install work that is to be concealed within the building construction in sufficient time to secure proper location without delay to the work of other trades.

D. Assume responsibility for location of chases, other openings through masonry and concrete construction. When work cannot be installed concurrent with building construction, arrange for rough-in boxes, sleeves, inserts and other items, as necessary for installation thereof at a later date.

E. If any work is installed so that the architectural design cannot be adhered to, Contractor is responsible for making such changes as Architect may require. Before installing work, report any interferences between work of this Division and work of other Divisions to Architect as soon as discovered. Architect will determine which work must be relocated, or make adjustments to maintain clearances, maximum headroom and to avoid conflict with other work.

F. Become familiar with the construction where work attaches. Review Structural Drawings for coordination of openings. Cut no structural members or slabs without Architect's and/or Structural Engineer's written approval.

G. Exercise caution when working in areas where concealed systems or materials may exist. Any costs for repair of damage incurred shall be the responsibility of Contractor causing the damage.

3.3 PROTECTION

A. All finished surfaces shall be protected from damage and spills during construction.

1. Protect finished floors with a heavy duty flexible fiber reinforced floor protection board - Ram Board or equal.
2. When setting up pipe cutting and threading machines, protect area against staining and abrasion. Provide plywood protection over Ram Board underlayment.
3. Protect finished surfaces from chips and cutting oil by use of a chip receiving pan and oil proof cover.

4. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
5. Protect finished surfaces from paint droppings, insulation adhesive, etc. by use of drop cloths.

B. The Contractor shall provide protection for any roof areas that will be affected by this scope of work. The roof protection shall be positioned such that it provides protection from falling objects such as tools and materials.

C. The cost of correcting any such condition will be charged against the respective Contractor.

3.4 EQUIPMENT INSTALLATION

A. Install equipment in accordance with equipment manufacturer's published installation instructions.

B. Should the Drawings and/or Specifications include procedures that exceed or call for materials that differ from the manufacturer's instructions, the Contractor shall follow the Drawings and/or Specifications. This requirement does not release the Contractor from the obligation to follow all other published instructions and installation recommendations. Contractor shall make Engineer aware, in writing, of discrepancies between the Drawings and Specifications and the manufacturer's published installation instructions, and/or confirm Engineer's design intent, prior to installation of the equipment. Failure to comply may result in reworking the equipment installation or replacement of materials associated with the equipment at no additional cost to the Owner.

3.5 CUTTING AND PATCHING

A. All cutting and patching in construction as necessary for installation of this work shall be the responsibility of this Division and performed by the Tradesmen related to that specific Division of work. Subcontract this work to the appropriate Trade Division.

B. Do not cut any structural member, including but not limited to steel framing and structural floors, without specific permission from the Architect and/or Structural Engineer.

C. Do not cut openings in roof or floor construction without specific permission from the Architect and/or Structural Engineer. Existing roof warranty must be maintained.

D. Where locations of penetrations are inaccurate or where building components are improperly cut by inadequate methods, the Contractor in error shall be responsible for complete repair.

E. The Contractor shall assume responsibility for removing and replacing existing ceiling tiles as required for installation of all work. Areas include that as outlined by the project scope and areas outside the scope where the Contractor is required to make connections to existing systems and install new work. Damaged tiles shall be replaced.

3.6 SERVICE SHUTDOWNS

A. This project involves remodeling of existing areas in an operating facility. Plan work including alterations and connections to existing facilities, to permit carrying on normal building functions. When necessary to temporarily interrupt a service, shutdowns shall be scheduled through the Owner and shall be done at a time as directed by the Owner. No additional compensation shall be allowed for these shutdown periods even though premium time work may be required unless specifically defined in Division 1.

B. Provide temporary service to equipment or systems that cannot be shut down, and as determined by Owner, or as described in the Contract Documents. Remove temporary services when permanent work is completed

C. Provide a minimum of one week notice to the Owner before any service shutdown is scheduled.

3.7 INDOOR AIR QUALITY

A. All occupied areas of building shall remain free from odors, fumes, dust and smoke generated from installation of material and equipment.

B. Arrange with the Owner to schedule isolation of areas where paints, adhesives, solvents, etc., will be used. Areas shall remain isolated until all materials have cured sufficiently as to stop out-gassing of fumes or odors and area has been ventilated to remove all detectable traces of odors and fumes.

C. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas.

END OF SECTION

SECTION 260101 - ELECTRICAL SUPPLEMENTAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to 26 01 00: Electrical General Provisions for additional Project requirements.

1.2 DESCRIPTION OF WORK

A. The following general term as used within the context of the Electrical Contract Documents shall be defined as follows:

1. The term "Technology" shall refer to all low voltage systems, related cabling infrastructure and conduit/backbox rough-in work indicated on the Division 27 Contract Documents. Refer to the Technology General Provisions section for additional Technology definitions.

1.3 WORK INCLUDES

A. The Electrical Contractor is responsible for all work scope included in the Division 26 and 27 Contract Documents. Therefore, any reference to the "Electrical" Contractor (EC) or the "Technology" Contractor (TC) shall explicitly refer to the Electrical Contractor. Should the Electrical Contractor require the services of the separate Technology Sub-Contractor to meet Division 27 requirements, work scope can be divided as indicated in the Division 26 and 27 Contract Documents.

1.4 ALTERNATES

A. Division 26 does not have alternates.

1.5 QUALITY ASSURANCE

A. Reference to the code and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

B. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. National Fire Protection Association (NFPA):

a. NFPA 70 - National Electrical Code, 2017
b. NFPA 72 - National Fire Alarm Code, 2016
c. NFPA 110 - Emergency and Standby Power Systems, 2016

2. American National Standards Institute (ANSI):

a. ANSI 117.1 - Specifications for Making Buildings and Facilities Accessible To, and Usable By, the Physically Handicapped

3. National Electrical Manufacturers Association (NEMA)
4. Institute of Electrical and Electronic Engineers (IEEE)
5. Illuminating Engineering Society (IES)
6. ASHRAE 90.1-2010: Energy Standard for Buildings

C. Workmanship shall be in accordance with the best NECA (National Electrical Contractor Association) practices of the trade. Electrical work shall be installed by journeymen electricians under the supervision of a competent foreman.

1.6 WORK REQUIRED FOR EQUIPMENT FURNISHED OR PROVIDED BY OTHERS

A. The Electrical Contractor shall wire items normally associated with equipment supplied by others such as line voltage limit switches and motor operated dampers. Line voltage shall be defined as the same voltage that the associated equipment is rated.

B. Starters supplied as an integral part of the equipment shall be provided under the Division furnishing the equipment. All other disconnect switches and starters shall be provided and wired by the Electrical Contractor.

C. Variable frequency drives furnished under the Division providing the equipment being controlled shall be installed and wired by the Electrical Contractor. Any associated additional disconnect switches shall be provided by the Electrical Contractor.

1.7 SUBMITTALS

A. Prior to commencing work, submit product data and/or shop drawings for Electrical equipment, materials and systems as required in each individual Division 26 Specification section. Provide all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.

1.8 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall indicate the location of all underground, under floor and concealed conduits .
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

B. Operating and Maintenance Manual (OMM)

1. Once submittals are completed, provide an OMM index to the Engineer for review. Once index is approved, submit an electronic copy of the OMM to the Engineer for acceptance.

2. Furnish electronic Portable Document Format (PDF) of Operating and Maintenance Manuals. Refer to Division 1 Specifications for additional requirements.

3. Each OMM shall be assembled into electronic file or multiple files broken up by section if the file size is larger than 15Mb.
4. Combine all electronic files and arrange as follows, unless directed otherwise by Division 1. If a section listed below does not apply to the Project, renumber sections accordingly. Multiple files broken up by secton are allowed if file size is greater than 15Mb.

    a. First Page --- Title of Project, Owner, Address, Date of Submittal, Name of Contractor and Name of Engineer, including contact information, phone number and email addresses.
    b. Second Page --- Index. Index shall include hyperlinks to each section listed.
    c. First Section --- Written description of system contents including where actually located in building, how each part functions individually, and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the Manufacturer's data in the file that describes the proper service.
    d. Second Section --- A copy of each shop drawing and catalog data sheet with an index at the beginning of the section. Index shall include hyperlinks to each item listed.
    e. Third Section --- A copy of each Manufacturer's operating and maintenance instructions with an index at the beginning of the section, and a copy of each Manufacturer's start up report.
    f. Fourth Section --- A copy of each wiring diagram utilized in the installation.
    g. Fifth Section --- A copy of all test results, in chart form, performed by the Contractor.
    h. Sixth Section --- Copies of all warranties, approvals, etc.
    i. Seventh Section --- Owner training sign-in sheets and a list of all digitally recorded training sessions.

        1) Include electronic format of all recorded training sessions on portable memory device (Optical media or USB stick).

    j. Eighth Section --- Record Drawings.
    k. Ninth Section --- A list of attic stock furnished for the project.
    l. An index shall be included at the beginning of each individual section.

5. The electronic OMM shall be delivered to the Owner and Engineer on portable memory device or other optical media - Owner shall be provided with up to 5 copies on separate portable memory devices or optical media and the Engineer shall be provided with a single copy.

    a. OMM index page shall have cross-reference links to each section.
    b. Sections containing more than 30 pages shall have a section index with cross-reference links.
    c. PDF text shall be recognizable and shall be searchable by use of a "Ctrl-F" or "find text" function.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Consult the Contract Documents and Submittals pertaining to the work for other trades. Review the field layouts for all trades and make adjustments accordingly in laying out the Division 26 work.

B. Examine the work of all other trades when it comes in contact with, or is covered by, work in this Division. Do not attach to, cover up, or finish against any defective work, or install work in a manner which will prevent proper installation of the work of other trades. Electrical Contractor shall be responsible for the costs of adjustments required.

3.2 PRODUCT HANDLING

A. Pay all costs for transportation of materials, equipment to job site.

B. Provide all scaffolding, tackle, hoists, rigging necessary for placing electrical materials and equipment in their proper place. Scaffolding, hoisting equipment: comply with applicable Federal, State, and Local regulations. Remove temporary work when no longer required.

C. Arrange for packaging of equipment, which must be hoisted, so that there will be no damage or distortion caused by hoisting operation.

D. Store Electrical equipment, etc., in a dry location and protect all Electrical equipment from dirt and moisture until the building is ready to receive them.

E. Coordinate location of stored items with other trades. Where necessary, store materials and equipment on movable carts so they may be moved when interfering with the work of other trades.

3.3 DAMAGE AND EMERGENCY REPAIRS

A. Assume responsibility for any damage to new or existing building components caused by work provided as part of Contract Documents. Repair all damage without extra cost to Owner.

B. Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during warranty period.

C. Restore roads, grounds, paving, building components, etc., to their original condition whenever this work causes damage.

3.4 CLEANING

A. At all times keep premises and building in neat and orderly condition, follow explicitly any instructions in regard to storing of materials, protective measures and disposing of debris.

B. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Clean all equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

C. All debris created by the execution of this work shall be removed as directed by the Architect or Owner.

D. Upon completion of work remove all tools, equipment and surplus materials.

3.5 PAINTING

A. Finish painting is included under Division 9 - Finishes, except where specifically called for in Basic Materials and Methods.

B. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.

C. No equipment or conduits shall be field painted before being connected or terminated. Where in-field painting occurs, insure components required for continuation of grounding systems are protected from paint until connected and installed.

D. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match the existing finish.

E. Under no circumstance shall any open cabling be painted.

3.6 TEMPORARY JOBSITE SERVICE

A. Provide a temporary electrical service adequate in size for power tools, heating, for the use of all trades and for the lighting of each room during construction. Include all utility company charges for providing this service to the project site. This service shall be provided as described in the Division 1 Specifications.

1. Provide temporary lighting and power distribution equipment as directed by the General Contractor .
2. Provide a written description and/or typical layouts of temporary lighting for construction as required by the local Authority.
3. Provide temporary service to equipment or systems which cannot be shut down, as determined by the Owner.

B. Temporary wiring shall conform to OSHA requirements.

C. The temporary electrical service can be extended from the Owner's existing power distribution system. The Owner must approve of the point of supply, the method of extension and the routing of necessary temporary feeders. No temporary service shall be extended from the emergency system unless approved by Owner.

3.7 INDOOR AIR QUALITY

A. Provide temporary ventilation and/or filtration systems of sufficient size and quantity to ensure complete removal of all odors, fumes, and airborne contaminants generated. Maintain 25 feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

B. If the building HVAC system is used and adjustments are made for ventilation purposes, rebalance systems to maintain occupied areas pressurization and air change requirements.

C. Arrange with Owner to override the HVAC system control of night setback functions to assist with ventilation of building.

D. Comply with SMACNA guideline "IAQ Guidelines for Occupied Buildings Under Construction" Second Edition - 2007.

END OF SECTION

SECTION 260200 – ELECTRICAL DEMOLITION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Electrical equipment indicated on the Demolition Drawings is shown to indicate the extent of demolition only, and is not intended to be a record drawing of the existing conditions. The Drawings and Specifications establish the minimum standards for workmanship and materials.

1. If additional interpretation is required regarding the scope of demolition, contact the Engineer prior to bid.

B. Include all labor, materials, equipment, services, and permits necessary for completion of the demolition work.

C. Provide protection for all adjacent areas before, during and after execution of the demolition work.

D. "Electrical equipment" as used in this section shall refer to lighting fixtures, light switches, receptacles and all other power and low voltage communication system devices.

E. Comply with all the rules and regulations of local and state Authorities Having Jurisdiction, including applicable OSHA safety requirements.

F. Visit the site and become familiar with conditions affecting the demolition work. No additional compensation shall be approved on claims that arise from a lack of knowledge of the existing conditions.

G. Normal building functions shall be maintained during the demolition work. Coordinate the day and time of any temporary building system interruptions with the Owner. Additional compensation shall not be approved for premium time effort.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment for completion of the demolition work as described within the Specifications and on the Drawings.

B. Materials and equipment shall be new and UL labeled for the application.

PART 3 - EXECUTION

3.1 GENERAL DEMOLITION WORK

A. Disconnect and remove the existing Electrical Work made necessary because of Project alterations as indicated or implied on the Contract Documents of all trades. Existing electrical equipment and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not. Relocate equipment and/or devices where indicated. Maintain existing circuit continuity as described in the Specifications and on the Drawings, or as required for continued operation of the electrical equipment and systems.

B. The Contractor shall de-energize circuits and panel feeders as required to make areas being demolished safe for demolition work. Coordinate exact power shutdown procedures with the Owner. Maintain power to areas that cannot be shutdown as determined by the Owner. All work shown on Contract Documents assumes work is performed on de-energized equipment unless otherwise noted.

C. Demolition Work under this Contract shall be accomplished by the Contractor in complete accordance with the Construction Procedure and Progress Schedule specified under Division 1. Proposal shall include any special phasing requirements related to demolition work as described in the Division 1 Specifications.

D. Where required, re-support existing conduits and cabling above ceilings being removed.

E. Electrically disconnect devices and equipment to be removed at the point of power supply and remove conduit and wiring complete to devices and equipment being removed. For building and mechanical equipment being removed by other trades, remove related disconnect switches, starters, and/or VFD's, as well as related conduit and wiring complete to the point of power supply.

F. Where building systems or circuits are interrupted because of the demolition work, Contractor shall reroute or relocate, modify and reconnect to provide a continuous system.

G. Cutting, patching and finishing, etc., for removed and relocated electrical equipment shall be included as part of the electrical work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing construction. Patching shall be performed by the qualified trade.

H. Where devices or conduits are removed from fire or smoke rated construction, penetrations shall be patched to match existing ratings with suitable materials to match existing construction. Patching shall be performed by the qualified trade. Where floor devices are removed, provide approved patching or fill components to maintain required fire ratings.

I. Existing electrical equipment shown as being reused or relocated shall be carefully removed, stored on the premises, and refurbished before reinstallation.

J. Equipment to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for salvage by the Owner. All other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

K. Where existing electrical equipment is indicated on the Drawings to remain, the existing wiring shall remain, along with the related conduit system, unless otherwise shown or noted on the Drawings.

L. In all cases where existing branch circuit conduit and wiring is to be re-used or extended within the remodeled area, the Contractor shall test for grounding continuity and shall test the existing branch circuit wiring as though new, in accordance with the testing procedures outlined elsewhere in these Specifications.

M. Cap existing empty conduits and plug open knockouts in existing electrical boxes or enclosures.

N. The Contractor shall be responsible for the complete removal of all abandoned cabling as required by the National Electrical Code.

O. Remove and reinstall existing ceiling tiles in areas outside the scope of demolition work as required to complete the demolition work outlined within these Specifications or indicated on the Demolition Drawings. Damaged tiles shall be replaced to match existing.

P. Consult the Drawings covering the work of all other trades, as well as the respective Contractors field layouts, and tick trace or utilize ground penetrating radar technology all concrete slabs being removed to identify the exact location of concealed electrical conduits. All conflicts shall be brought to the attention of the Architect and Engineer prior to the beginning of slab removal. Rework or reroute existing conduits and feeders as directed by the Engineer.

3.2 DISPOSAL

A. Mercury Abatement

1. Remove and recycle mercury containing fluorescent and HID lamps as universal waste, in accordance with the EPA universal waste rule.
2. All Mercury-related operations shall be performed in accordance with the EPA universal waste rule, Regulation 40 CFR Parts 260, 261, 264, 265, 268, 270 and 273 for mercury containing fluorescent and HID lamps.

B. PCB Abatement

1. Remove ballasts which contain polychlorinated biphenyl (PCB), in accordance with current environmental regulations.
2. All PCB-related operations shall be performed in accordance with EPA Regulation 40 CFR 761, Polychlorinated Biphenyls, Manufacturing, Process, Distribution in Commercial Use Prohibition.

C. Properly dispose of all ionization type smoke detectors during demolition work as required by local, state, and regional codes.

D. Properly dispose of all batteries during demolition work as required by local, state, and regional codes.

END OF SECTION

SECTION 260300 - ELECTRICAL BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Equipment Identification

B. Supporting Devices

C. Equipment Mounting

D. Painting

E. Equipment Connections

F. Access to Equipment and Devices

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment installed under this Contract shall be new and of the quality herein specified. Each class of materials shall be of the same type and make throughout the building.

2.2 EQUIPMENT IDENTIFICATION

A. Provide nameplates on all equipment of the type listed in the following schedule:

1. Panelboards including general Arc Flash Warning
2. Distribution Equipment including general Arc Flash Warning
3. Safety Switches including general Arc Flash Warning
4. Motor Starters including general Arc Flash Warning
5. System Distribution Junction Boxes and Pullboxes
6. System Control Panels
7. Individual Overcurrent Protection Devices in Distribution Type Panelboards and Switchboards
8. Provide detailed Arc Flash PPE labels on Power Distribution Equipment per NFPA 70E. Refer to the Power Distribution System Studies Section for additional information.

B. Unless otherwise indicated on the Drawings, lettering shall include the name or designation of equipment, horsepower, voltage rating and service designation.

C. Nameplates for panels and other distribution equipment shall be laminated phenolic with a black surface and white core. Nameplates may be attached to wall adjacent to equipment if area for attachment is too small. Nameplates for boxes, conduit, etc., shall be high quality adhesive tape.

D. Cabinet and panel doors shall be marked with the identification numbers used on the Drawings. Recessed panel doors shall be marked on the inside of door. Surface panels and distribution equipment shall be marked on the exterior trim near the top of the cabinet.

E. Junction box Identification shall comply with the following:

1. The outside of the coverplates for all junction boxes, splice boxes, pull boxes shall be permanently marked to identify the following systems:

   a. Normal System including voltage including panel and/or system serving box
   b. Emergency/Standby system including voltage including panel and/or system serving box
   c. Voice/Data
   d. Fire Alarm
   e. Cable Television
   f. Sound/Paging
   g. Security

2. The identification shall be inside of the coverplate where located in finished areas.
3. At minimum, high quality adhesive tape shall be utilized for labeling.

F. Identification of branch circuits shall be typewritten on directory cards as described elsewhere within these Specifications.

G. Provide new typewritten directory cards with updated schedules for all existing panels with new or modified circuits. Existing load description should be obtained from existing panel schedules in the field and reflected in new, updated directory cards.

PART 3 - EXECUTION

3.1 SUPPORTING DEVICES

A. All hardware, supports, hangers, brackets, angle iron, channels, rods and clamps necessary to install Electrical equipment shall be provided to suit the field conditions and the applications intended as shown on the Drawings. The use of perforated straps is not permitted. Approved Manufacturers are Unistrut, Allied, Kindorf or equal.

B. Where fireproofing is removed to install supporting hardware, it shall be patched and re-installed using approved products.

C. Supporting devices and hardware shall be galvanized steel or aluminum material.

D. Design all miscellaneous steel in accordance with American Institute of Steel Construction (AISC) Steel Construction Manual and as specified under other Divisions within these Specifications.

E. All supporting devices shall conform to latest requirements of ANSI Codes, and shall be UL Listed, where applicable.

3.2 EQUIPMENT MOUNTING

A. All Equipment mounted on interior or exterior block or masonry walls or on interior equipment room walls where additional support is required shall be attached to ¾ inch painted plywood fire rated boards furred out one inch from wall. Boards shall be painted to match wall finishes.

B. Disconnect switches or motor starters (including variable frequency drives) mounted on or adjacent to mechanical and building Equipment shall be located to allow the proper working clearance as defined in Article 110 of the National Electrical Code.

C. It is the responsibility of the Electrical Contractor to provide additional mounting supports such as channel, brackets, angle iron, etc. as may be required to install equipment such as disconnect switches, motor starters (including variable frequency drives), panels and other Electrical equipment. This requirement extends to field conditions where ample wall space is not available, proper clearances cannot be maintained, or similar instances.

3.3 PAINTING

A. Where indicated on Drawings, painting of conduits and surface raceways shall be the responsibility of this Division as performed by qualified Tradesmen to perform this work. Subcontract this work to the appropriate Trade Division.

B. Indoor air quality during painting shall adhere to precautions specified elsewhere in these Specifications.

C. Paint products shall be as specified in Division 9.

D. Under no circumstance shall painting of open cabling be acceptable.

3.4 EQUIPMENT CONNECTIONS

A. Install the required power and control feeds, and connect equipment being installed during the construction period. Provide facilities only for equipment that will be moved in, set and connected later by the Owner, as indicated on the Drawings.

3.5 ACCESS TO EQUIPMENT AND DEVICES

A. All electrical equipment and other devices requiring examination, adjustment, service, and maintenance shall be accessible. If located above drywall ceiling or behind finished walls, provide an access door. Coordinate all access door locations with the Architect and General Trades.

B. To ensure accessibility during and after construction, when a device is installed, its location shall be marked with securely attached temporary signage. Signage shall indicate the amount of clearance required for the specific device. Signage shall remain in place until the ceiling or access door is installed or until substantial completion.

C. Clearance shall include not only code required clearance but also clearance for Owner's staff to access the device. This access shall be from the floor or from the floor level using normal maintenance ladders and apparatus to meet all OSHA requirements. Consideration shall be given to accessing a device through an access door.

D. Where a device is installed above finished ceilings, signage shall be hung below the device at the finished ceiling level. Where a device is exposed, in open ceiling areas, signage shall be hung at approximately 8' above the floor level.

E. Electrical Contractor shall monitor these access locations until substantial completion and notify Architect, Owner and Engineer when the access area is encroached upon so that corrective action may be taken immediately.

F. Corrective action shall be the responsibility of the trade encroaching the access area unless identified that the equipment in question is installed incorrectly .

END OF SECTION

SECTION 260310 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Copper Wire and Cable

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment installed under this Contract shall be new and of the quality herein specified. Each class of materials shall be of the same type and make throughout the building.

2.2 COPPER WIRE AND CABLE

A. Wire and cable for branch circuits and for feeders, 600 volt and below shall be 90°C., 600 volt, Type THHN/THWN-2, copper only, unless otherwise indicated on the Drawings. Type XHHW shall also be acceptable for feeders. All 600 volt wiring shall be in conduit. Conduit shall be as specified elsewhere in these Specifications.

B. Where wire size is not indicated on the Drawings, use ampacity ratings of 60°C for wire 100 amperes and below, and 75°C for wire above 100 amperes, as listed in Table 310.15(B)(16) of the National Electrical Code.

C. Minimum size for power and lighting branch circuits, including lighting fixture "whips", shall be #12. Wire sizes #10 and smaller may be solid or stranded. Wire sizes #8 and larger shall be stranded.

D. Control wires shall be #14 stranded THWN copper. All control wiring shall be terminated with fork type "Sta-Kon" type connectors.

E. Secondary neutral conductors of K-rated transformers shall be sized at 200% of the ampacity of the phase conductors.

PART 3 - EXECUTION

3.1 WIRE AND CABLE

A. Wire shall be delivered to the project site in complete coils with Manufacturer's name and approval tag indicating wire size and type of insulation, fastened to each coil.

B. Wire shall be installed in all lighting and appliance panelboards, power panelboards, switchboards and switchgear in a neat and workmanlike manner per NEC and NECA standards. No coiled, excess and draped wiring is permissible.

C. Individual branch circuits are shown on the Drawings for clarity. Lighting and receptacle circuits may be grouped for homeruns, with a maximum of three (3) circuits per conduit.

1. Conductors in conduits may exceed quantity indicated above provided that the Contractor derates the conductors in strict accordance with Article 310 of the National Electrical Code. Calculations shall be submitted to the Engineer for approval.

D. Neutral conductors shall not be shared. Neutral conductors shall be provided in each outlet box containing luminaire control devices.

E. For 120 volt branch circuits where size is not shown, conductor size #12 minimum shall be used for circuits less than 125 feet, and size #10 minimum shall be used for circuits 125 feet or greater. For 277 volt branch circuits where size is not shown, conductor size #12 minimum shall be used for circuits less than 250 feet, and size #10 minimum shall be used for circuits 250 feet or greater. Ground conductors shall also be increased to #10 accordingly.

F. Identify wire and cable for branch circuits as follows: For 208Y/120V, 3-phase, 4-wire systems, phase A/B/C shall be black/red/blue respectively with white neutral and green ground conductors. For 480Y/277V, 3-phase, 4-wire systems, phase A/B/C shall be brown/orange/yellow with gray neutral and green ground conductors.

G. Color coding of feeders shall be by means of colored tape or colored insulation at terminals.

1. If required, re-identify conductors at switches as required by Article 200.7(C) of the National Electrical Code.

H. Provide all branch circuits wiring with adhesive label indicating circuit number at the phase and neutral conductor at the termination location in each panelboard.

I. All mechanical wire and cable terminations shall be torque tightened with a torque wrench or a torque screwdriver to Manufacturer's recommended torque values.

J. It is the Contractor’s responsibility to coordinate wire sizes shown on Drawings with lugs provided on mechanical equipment during the submittal phase. Any compression cable adapters required shall be provided and shall be listed for the intended current carrying capacity of the conductors specified.

K. Pull wire and cables into conduit using Ideal Industries "Yellow 77 or 77 plus", or equivalent product or method.

L. Leave 6 inches free wire at all outlet boxes for wiring device connection.

M. Mechanical means may be used to pull conductor size #4 and larger.

N. Joints in conductor size #10 and smaller shall be made with Minnesota Mining and Manufacturing Co. (3M) insulated "Scotch Locks", Ideal Industries "Wing-Nut", Thomas and Betts (T & B) Co. "Marrette" connectors, or with mechanically crimped sleeves as manufactured by Thomas and Betts (T & B) Co. or Ideal Industries. Connector sleeves shall be insulated with pressure sensitive electrical tape equal to Minnesota Mining and Manufacturing Co. (3M) Scotch No. 33 plus.

1. For joints located in exterior handholes or similar installations subject to occasional standing water, provide splice kits, Raychem GHFC-1-90 or equal.

O. Joints and splices in conductor size #8 and larger shall be made with pressure type mechanical connectors and insulated with electrical tape to 150% of the insulating value of the conductor insulation.

P. Splices in wireways, where indicated on Drawings, where an incoming feeder is spliced to serve multiple outgoing loads shall be provided with Multi-tap conductor kit by Ilsco or equal.

Q. Splices and joints are not acceptable in panelboards, switchboards and switchgear.

END OF SECTION

SECTION 260320 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Boxes

B. Conduits

C. Floor Boxes

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment installed under this Contract shall be new and of the quality herein specified. Each class of materials shall be of the same type and make throughout the building.

B. Raceway systems, conduit, boxes, grounding, busbars, hardware, cable tray, etc. required for all Technology systems, cabling and/or devices shall be provided by the Electrical Contractor unless otherwise indicated on the Drawings (Scope Matrix) or as indicated in the Division 27 Contract Documents. The Electrical Contractor shall fully coordinate all requirements with the systems suppliers and shall review the Technology Drawings and Specifications prior to bidding.

2.2 BOXES

A. Contractor shall provide junction boxes with covers in order to accommodate branch circuiting as shown on the Drawings.

B. Flush device boxes in masonry walls shall be masonry boxes listed for the purpose, or 4-inch square boxes with raised coverplates listed for masonry. Flush boxes in other walls shall have raised coverplates suitable for the wall material.

C. Wiring device boxes for surface conduit work shall be stamped steel boxes listed for their applications.

D. All junction boxes and pullboxes shall be 4 inch x 4 inch x 2 inch deep minimum, or sized in accordance with the National Electrical Code if a larger box is required. Junction box and pullbox coverplates shall be suitable for their intended use. Provide identification on the coverplates as described elsewhere in these Specifications.

E. All junction boxes for dimmers shall be 4 inch x 4 inch x 2-1/2 inch deep.

F. Exterior boxes shall be cast aluminum type. Where outdoor weatherproof receptacles are installed, weatherproof gasketing shall be provided.

2.3 CONDUITS

A. Electrical Metallic Tubing (EMT)

1. All conduits, unless otherwise specified herein, shall be Electrical Metallic Tubing (EMT). Conduits shall be ¾ inch trade size, minimum, unless otherwise noted on the Drawings or within these Specifications. Where sizes are not shown, conduits shall be as required to accommodate the number and type of conductors in accordance with the National Electrical Code wiring tables, but shall not be smaller than ¾ inch.

B. Metal Clad (MC) Cable

1. As part of the Base Bid, flexible metal conduit or MC type cable may be used in lieu of EMT conduit within architectural casework and low partitions (6 feet and less).

C. Rigid Galvanized Steel (RGS)

1. Conduits shall be heavy wall rigid galvanized steel or intermediate grade steel in the following areas unless otherwise noted:

   a. In exterior masonry walls on the exterior side of the vapor barrier
   b. In masonry walls below grade
   c. In concrete floors, walls or slabs
   d. In damp or wet locations

2. Conduits that are exposed in public or normally occupied spaces shall be heavy wall rigid galvanized steel to a level of 8 feet above finished floor. Electrical rooms and Mechanical rooms are not considered public or normally occupied spaces.

D. PVC Conduit

1. Interior underground conduit shall be Schedule 40 or 80 PVC. Such interior underground conduit shall be protected from damage during construction. All PVC conduit shall conform with NEMA Standard TC2 and UL 651.
2. Where building interior wall construction is comprised of masonry or poured concrete, PVC-40 shall be acceptable. Raceway shall transition to EMT prior to installation within the ceiling space in either plenum or non plenum conditions.

E. Conduit for Special Conditions

1. Conduits passing from exterior to interior require foam based adhesive to protect water leakage into building to be installed after conductors are installed. Acceptable Manufacturer shall be Polywater FST-250 or approved equal.

2. Conduits that stub through the roof shall be supplied with pipe seals as manufactured by the Pate Co. or approved equal and shall be installed as recommended by the Manufacturer by a licensed Roofing Contractor. Pipe seals shall be one piece aluminum base type with five inch sloped roof surface flanges, graduated stepped PVC boots and adjustable stainless steel clamps. RPS Corporation and Thycurb Corporation are approved equivalent Manufacturers. When applicable, the Contractor shall coordinate and verify exact requirements with the Roofing Contractor prior to procurement and installation of the pipe seals.
3. Exposed conduits installed in parking garages shall be aluminum PVC 80

F. Conduit Identification

1. Provide permanent nameplates for all pull and junction boxes identifying circuits, voltage and source.
2. All labels where installed above ceilings shall be plenum rated.

G. Fittings and Couplings

1. Cold-rolled steel double set screw fittings shall be used for all EMT conduits. Provide single set screw for ¾" conduits and smaller..
2. Heavy wall rigid galvanized steel conduits shall have threaded fittings. Heavy wall rigid galvanized steel conduit couplings and hubs shall have no less than five (5) threads of conduit engaged and screwed tight.

2.4 FLOOR BOXES AND FIRE RATED THROUGH FLOOR FITTINGS

A. Refer to schedules on Drawings for descriptions and product Specifications.

PART 3 - EXECUTION

3.1 CONDUITS

A. Interior Conduits

1. Conduits shall be continuous and secured to all boxes in such a manner that each conduit system shall be electrically continuous from the point of service to all device boxes. Conduits shall be supported in accordance with the National Electrical Code. Terminals of all conduits shall be furnished with locknuts and insulating bushings. Plug ends of each conduit with an approved cap to prevent the entrance of foreign materials during construction.

   a. Actual routing of conduits shall be installed to suit the various field conditions. Any field changes necessary to conceal conduit or to avoid work of other trades shall be made without additional expense to the Owner.

2. Flexible metal conduit and flexible metallic cable assemblies shall be supported at intervals not exceeding 4½ feet and within 12 inches of every outlet box, junction box, cabinet, light fixture, or fitting, unless otherwise allowed by the National Electrical Code.
3. Conduits concealed in masonry construction shall be installed during wall construction.
4. Branch circuit conduits installed in a floor slab above ground level or in concrete work shall have a minimum of 1½ inches of concrete cover and clean threads.

5. Install exposed conduits parallel to, or at right angles to building structural members. Vertical runs shall be plumb.
6. All conduits terminating in sheet metal enclosures shall be provided with a single grounding/bonding type locknut with a set screw.
7. All exposed conduit ends within enclosures shall be provided with insulated bushings.
8. Provide expansion conduit fittings at all points where conduits cross building expansion joints.
9. Conduits shall not be installed in the basement and/or ground floor slab. Under slab conduits shall be installed within the engineered fill in a manner that protects the conduit during construction.
10. Empty conduits shall include heavy duty pull line with labels identifying the conduit's origin and destination. Pull lines shall be made of continuous fiber polypropylene, have tensile strength of 210 lbs., be rot and mildew resistant, be capable of being blown directly into conduit and have a colored tracer for easy identification.
11. Contractor shall provide a minimum of three empty ¾-inch conduits stubbed into the nearest accessible ceiling space (above or below) for all recessed panelboards, fire alarm control panels, and other system control panels.
12. Exposed conduits that penetrate through a floor shall be provided with 3½-inch high concrete curb with a minimum of 3 inch envelope around conduit(s) at floor level.
13. Conduits, boxes or other raceway systems that penetrate through fire rated floors, walls, ceilings, decks, smoke partitions, etc. shall be constructed so as to maintain the integrity of the fire or smoke rated areas. Penetrations shall not exceed an aggregate area of 1 square foot in any 100 square feet of surface area, or as dictated by local codes.
14. A separation of 12 inches minimum is required between conduits and hot water piping, steam piping, and similar system piping.
15. PVC conduit shall not be used when crossing over steam piping. Rigid galvanized steel conduit shall be used for a minimum of 10 feet on either side of steam piping.
16. Conduits shall not be installed on the exterior walls or on the roof of the building, unless noted otherwise on the Drawings.
17. All interior building conduits shall be concealed in new construction, unless noted otherwise on the Drawings.
18. In remodeled areas, or where it is not possible to install concealed conduit, permission must be obtained from the Architect to run surface mounted raceways or conduit. The routing and elevation must be coordinated with the Architect before installation. Exposed raceways in finished areas shall be painted to match adjacent finishes.

B. Exterior Conduits and Special Conditions

1. Conduits in wet or damp areas shall be water tight. Joints shall be sealed with weatherproof sealing compound. Contractor shall provide covers during Construction to prevent water from entering conduits.
2. Conduits passing from the exterior to the interior of a building shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway per Article 300.7(A) of the National Electrical Code. Provide pullbox or similar device at this location such that material is visible for inspection.
3. Conduit supporting systems shall be attached to the deck, slab, or structural framing only and not to any other appurtenances at the ceiling such as mechanical ducts, pipes and suspended ceiling hanger wires, framing members, etc.

C. Fittings and Couplings

1. Contractor shall utilize boxes, fittings and mounting accessories appropriate for the specific conduit systems installed as recommended by the conduit Manufacturer.
2. All PVC fittings and joints shall be cleaned and provided with associated adhesive.

3.2 OUTLET BOXES

A. Outlet boxes concealed in masonry construction shall be installed during wall construction.

B. All boxes shall be rigidly supported from the building structure independent of the conduit system. Boxes cast into masonry or concrete are considered to be rigidly supported. Box stabilizers shall be utilized to properly support boxes in metal stud construction.

C. All outlets, toggle switches and receptacles shall be centered with regard to paneling, trim equipment, etc., and shall line up with either bottom or top of masonry courses. Changes to the specified mounting heights of any device shall be approved by the Architect or Owner's representative before rough-in.

1. Changes will not be permitted where such changes conflict with ADA mounting height requirements.
2. Determine the actual direction of all door swings such that toggle switches and other control devices shall be installed at the lock side of doors unless otherwise noted or unless field conditions do not allow. Improperly located devices shall be relocated without additional expense to the Owner.

3.3 FLOOR BOXES AND FIRE RATED THROUGH FLOOR FITTINGS

A. Floor boxes and fire rated through floor fittings shall be installed in accordance with the Manufacturer's recommended installation procedures.

B. All locations shall be field verified with the Architect before core drilling.

C. Provide vapor barrier under sheet-steel floor boxes installed in concrete floors at or below grade.

D. Penetrations through fire rated floors shall not exceed an aggregate area of 1 square foot in any 100 square feet of floor area, or as dictated by local codes.

END OF SECTION

SECTION 260330 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Conduits

B. Handholes

C. Excavation, Concrete and Backfill

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment installed under this Contract shall be new and of the quality herein specified. Each class of materials shall be of the same type and make throughout the building.

2.2 CONDUITS

A. Exterior Underground Conduit

1. Conduits passing from exterior to interior require foam based adhesive to protect water leakage into building to be installed after conductors are installed. Acceptable Manufacturer shall be Polywater FST-250 or approved equal.
2. Conduits that stub through the foundation walls into below grade areas shall be supplied with pipe seals as manufactured by Link-Seal, Wal-Rich, Mason-Dallas or an equivalent product or method as approved by the Engineer. Pipe seals shall be EPDM (black) with stainless steel hardware. The Contractor shall coordinate and verify exact requirements with the Architect prior to procurement and installation of the pipe seals.
3. Exterior underground conduit shall be schedule 40 PVC. Such conduit shall be encased in concrete under drives or roadways and any other locations indicated on Drawings, with a 3-inch envelope, minimum with a 2-inch separation minimum between duct bank conduits.

2.3 HANDHOLES

A. Provide handholes for exterior conduit runs as shown or noted on the Drawings.

B. Handholes shall be constructed of polymer concrete specifically made for exterior underground utility construction. The use of chopped fiberglass, high density polyethylene or high density polystyrene material is prohibited. Handholes shall be designed for 5,000 lbs. load over 10 square inches. Stackable and extendable assemblies shall be permitted where required to reach the depth of the conduits or to match finished grade.

C. Provide divided enclosures where indicated on the Drawings. Divided enclosures shall have dual logo covers.

D. Handhole covers shall be gasketed (flanged cover) and provided with tamperproof (penta-head) stainless steel hardware. Owner shall be furnished with two sets of pent-head sockets and cover hooks.

E. Handholes shall be green in color with cover logo as appropriate for system as follows:

1. "Electric" - Electric power feeders.
2. "Communications" - Communications cabling or rough-in.

F. Handholes shall be as Manufactured by Quasite/Strongwell or approved equal.

PART 3 - EXECUTION

3.1 CONDUITS

A. Exterior Conduits and Special Conditions

1. Exterior underground conduits shall be installed 36 inches below grade, minimum.
2. Exterior underground conduits shall be water tight. Joints shall be sealed with weatherproof sealing compound. Contractor shall provide covers during Construction to prevent water from entering conduits.
3. Conduits passing from the exterior to the interior of a building shall be filled with an approved material to prevent the circulation of warm air to a colder section of the raceway per Article 300.7(A) of the National Electrical Code. Provide pullbox or similar device at this location such that material is visible for inspection.
4. Conduit supporting systems shall be attached to the deck, slab, or structural framing only and not to any other appurtenances at the ceiling such as mechanical ducts, pipes and suspended ceiling hanger wires, framing members, etc.
5. A separate ground conductor shall be installed in all feeder and branch circuit exterior underground PVC conduit.
6. PVC conduit joints shall be solvent welded watertight in accordance with the Manufacturer's recommendations.
7. For exterior underground PVC conduit, vertical transitions to an above ground exposed exterior condition shall be made with rigid steel ells. The underground transition from PVC to rigid steel shall be made five feet from the ell. When such conduit transitions within a building, it shall transition immediately upon penetrating up through floor such that entrance and connection to all distribution equipment shall be made with steel conduit and fittings.
8. For conduit encased within a concrete ductbank, minimum cover shall be 3 inches.

B. Fittings and Couplings

1. Contractor shall utilize boxes, fittings and mounting accessories appropriate for the specific conduit systems installed as recommended by the conduit Manufacturer.
2. All PVC fittings and joints shall be cleaned and provided with associated adhesive.

3.2 HANDHOLES

A. Install handholes as recommended by the Manufacturer.

B. Install handholes on a base comprised of 12 inches of gravel or crushed rock (tamped in 6 inch lifts) extending 12 inches beyond the outside edges of the enclosure.

C. Handholes shall not be installed in sidewalks or roadways unless indicated otherwise on the Drawings.

3.3 EXCAVATION, CONCRETE AND BACKFILL

A. Provide all excavation, concrete and backfill work necessary for installation of Electrical work exclusively. Refer to Division 1 Earthwork Specifications for additional requirements.

B. Prior to opening and excavation, effort shall be made to determine whether underground installations; i.e., sewer, telephone, water, fuel, electric lines, etc., will be encountered, and if so, where such underground installations are located. When the excavation approaches the estimated location of such an installation, the exact location shall be determined and when it is uncovered, proper supports shall be provided for the existing installation. Utility companies shall be contacted and advised of proposed work 48 hours PRIOR TO THE START OF ACTUAL EXCAVATION. Contact Ohio Utilities Protection Service at 1-800-362-2764.

C. Dig trenches to the exact grade and depth with only sufficient dirt removed at holes to provide working space. Refill trenches excavated below required depth to proper depth with sand. Shore or sheet pile trenches to prevent caving. Do not endanger work of other Contractors or existing structures. Contractor shall be held solely responsible for such damage.

D. In event that rock is encountered during excavation, notify the Architect at once.

E. After installation has been completed and approved for backfill, refill all excavation inside of the building and under paved areas outside of the building with #57 backfill per ASTM-448, the previously excavated material if this excavated material is determined by the Architect to be suitable for reuse, or premium backfill as determined by the Architect. Backfill shall be made and tamped in 6" layers. Refill trenches outside of the building and not under paved areas with selected dirt to 6 inches above finished grade to provide for settlement.

F. Sand exclusively is not permitted for backfill.

G. Remove and dispose of all material not used for backfill.

H. Special care shall be taken to protect trees and shrubbery adjacent to trenches. If roots of live trees are encountered during excavation, protect as directed by the Architect.

I. Provide and operate pumping equipment as necessary to keep trenches free of water.

J. When excavation is necessary in an existing lawn, reseed to match existing lawn, as directed by the Architect.

K. Where trenches cross roads, walks or parking lots, provide suitable barricades and bridges adequately protected by signs or red flags during day and by lights at night, as directed by the Architect.

L. Repave all roads, sidewalks or parking lots to the satisfaction of the Architect and the authorities having jurisdiction. Paving material or concrete shall match the existing conditions to the extent possible.

END OF SECTION

SECTION 260340 - WIRING DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Toggle Switches

B. Receptacles

C. Coverplates and Identification

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment installed under this Contract shall be new and of the quality herein specified. Each class of materials shall be of the same type and make throughout the building.

2.2 TOGGLE SWITCHES

A. Local toggle switches shall be 20 ampere, 120/277 Volts, AC specification grade, with grounding terminal:

1. Locking Toggle (Key Operated), provide two keys per switch:

   a. Hubbell # HBL1221L thru HBL1224L Series with 1209 Keys.

2. Illuminated toggle - light on with load off.

   a. Hubbell # HBL1221-IL.

3. The equivalent series by Pass and Seymour, Cooper or Leviton shall be acceptable.

2.3 CONTROL DEVICES

A. Luminaire Control Occupancy Sensors - Refer to Luminaire Control Specification Section for requirements.

2.4 RECEPTACLES

A. Duplex receptacles shall be tamper resistant, 20A, 125V, 2 pole, 3 wire grounding type as follows:

1. Heavy duty duplex receptacles:

a. Hubbell # HBL5362TR.

2. The equivalent series by Pass and Seymour, Cooper or Leviton shall be acceptable for receptacles specified above.

B. Duplex GFCI receptacles shall be tamper resistant, 20A, 125V, 2 pole, 3 wire, with UL943 integral ground fault circuit interrupter as follows:

1. Heavy duty duplex receptacles:

a. Hubbell # GF5362SG.

2. The equivalent series by Pass and Seymour, Cooper or Leviton shall be acceptable for GFCI receptacles specified above.

C. For damp or wet locations, duplex GFCI receptacles shall be tamper resistant and weather resistant, 20A, 125V, 2 pole, 3 wire, with UL943 integral ground fault circuit interrupter as follows:

1. Heavy duty duplex receptacles:

a. Hubbell # GF5362SG.

2. The equivalent series by Pass and Seymour, Cooper or Leviton shall be acceptable for receptacles specified above.

D. Special purpose single receptacles, if required, shall be as indicated on the Drawings. Verify the proper NEMA configuration of such receptacles with the equipment to be served, before installation.

1. 15A and 20A, 125V and 250V rated special purpose single receptacles located in damp and wet locations shall be Weather-Resistant (WR) rated.

E. All receptacles shall be provided with a self-grounding clip at the mounting screw.

2.5 DEVICE AND COVERPLATE COLORS AND IDENTIFICATION

A. All toggle switches, dimmers and receptacles shall be ivory unless otherwise indicated within these Specifications. Verify color with the Architect prior to procurement of the devices.

B. Coverplates for receptacles and all types of luminaire control devices shall be as described below:

1. All coverplates shall be smooth high impact commercial grade thermoplastic or smooth nylon finish to match the devices.

C. The inside of all coverplates shall be permanently marked to identify panel and circuit number.

D. In unfinished areas, use cadmium plated, round corner, steel coverplates for surface mounted outlet boxes.

E. Weatherproof receptacle covers in damp locations shall be single gang, GFCI duplex type, flip-up/self-closing type, die cast aluminum, UL Listed for wet locations while in use.

F. Weatherproof switch covers shall be clear bubble plate type for use with AC toggle switches.

G. Provide tamper resistant coverplates for tamper resistant devices, including associated backplate, hardware, and (3) screwdrivers, where shown on Drawings.

H. The coverplates shall be by the same Manufacturer as the wiring device.

PART 3 - EXECUTION

3.1 RECEPTACLES AND TOGGLE SWITCHES

A. Install devices as indicated on the Drawings. All devices shall be flush mounted unless otherwise shown on the Drawings or indicated in these Specifications.

1. Provide individual duplex GFCI receptacles as shown on the Drawings. Standard receptacles wired to "upstream" GFCI receptacle for GFCI protection shall NOT be acceptable. GFCI receptacles shall not be through-wired.

B. Verify device and coverplate colors with the Architect before procurement.

C. Adjacent devices of the same voltage class shall be mounted in ganged boxes. Provide a common coverplate.

D. Mounting heights to the center of outlet boxes shall be as indicated on the Drawings.

E. Verify mounting heights and locations with the Architect before rough-in. Refer to details and interior wall elevations shown on the Architectural Drawings.

F. Outlets shall not be installed back to back.

G. As described elsewhere in this Section, receptacles shall be permanently marked to indicate the panel and circuit number of the device. Panelboard abbreviations shown on Drawings are not permitted. Indicate complete panel name and circuit number.

H. All receptacles shall be installed with the ground opening above the phase and neutral openings. Horizontally mounted receptacles shall be installed with the neutral opening above the phase opening.

I. All devices shall be secured with more than a single screw.

END OF SECTION

SECTION 260400 - ELECTRICAL FIRESTOPPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work of this Section includes, but is not limited to, furnishing and installing firestopping for fire-rated construction in the following areas:

1. All openings in fire-rated floor, wall, ceiling and roof assemblies, both empty and those accommodating penetrating items.
2. Openings at each floor level in shafts or stairwells.
3. Empty openings intentionally designed as spare openings in fire rated Construction.

B. Penetrating items shall include the following:

1. Cables.
2. Conduit.
3. Raceways.
4. Cable trays.
5. Busways

1.2 QUALITY ASSURANCE

A. General

1. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings required by local building code and as tested by nationally accepted test agencies per fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance of the assembly being penetrated.
2. Manufacturer¢¢s engineering judgments will be accepted for non-standard applications or where no tested system exists. Drawings for engineering judgments must indicate the UL tested system or systems upon which the judgment is based, in order to evaluate the engineering judgment against a known performance. Engineering judgments shall be approved by the Architect.
3. Firestopping materials and systems shall be capable of closing or filling openings created by:

   a. The burning or melting of combustible materials.
   b. Deflection of materials due to thermal expansion.

4. Firestopping material shall be non-halogenated, lead and asbestos free and shall not incorporate nor require the use of hazardous solvents.
5. Firestop products which dissolve in water after curing are not acceptable.
6. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to a Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Manufacturer's Field Representative: The Manufacturer of the firestop material of this Section shall provide a qualified field representative at the site.

D. Pre-Installation Conference: Contractor shall hold a pre-installation conference with representatives of the Architect, Contractor, Installer, Materials Manufacturer and various trades involved in the Work, to review conditions affecting the installation and consistency of manufacturer to be used by all trades.

E. Conform to Manufacturer's printed instructions for installation in accordance with a U.L rated system or Manufacturer¢¢s engineering judgement.

F. Codes and Standards

1. ASTM E 84
2. ASTM E 119
3. ASTM E 814
4. UL 263
5. UL 1479

1.3 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. All submittals shall conform completely to the requirements of the Contract Documents.

C. Product Data: For each type of material to be installed, literature shall indicate product characteristics, typical uses, performance, test data and Manufacturer's installation procedures.

D. Shop Drawings: Include U.L. rated system number and details for each type of penetration or configuration.

1. Show typical installation details including:

a. Minimum and maximum allowable annular spacing.
b. Base material composition.
c. Firestop materials selected.
d. Applied thickness required to achieve the hourly rating.

E. Where required, submit Product Data and Shop Drawings to the Authority Having Jurisdiction (AHJ) for review and approval. Information shall include the Manufacturer's assembly detail with UL system number, technical data and installation instructions for each penetration type occurring on the project.

F. Close-out Documents

1. Final approved product data and shop drawings of all materials installed shall be included in operating and maintenance manuals.
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer¢¢s labels identifying product and manufacturer, UL label, date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes. Materials shall be stored off the ground and protected from environmental conditions as required by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.5 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, provide for curing in accordance with manufacturer suggested temperature requirements.

B. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

C. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

D. Do not use materials that contain flammable solvents.

E. Do not install water based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.

1.6 PROTECTION

A. Where firestopping is installed at locations which shall remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.7 SEQUENCING

A. Coordinate this work as required with work of other trades.

B. Firestopping shall precede finishing of gypsum board.Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal deck placement or composite deck installation but before placement of concrete.

1.8 WARRANTY

A. Contractor shall provide written certification that all firestopping was installed in accordance with the Manufacturer's written instructions for UL tested assemblies and that all firestop systems installed meet firestopping requirements as herein specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials shall meet the requirements specified herein.

B. For applications where combustible penetrants are involved, i.e. insulated or plastic pipe, a suitable intumescent material must be used.

2.2 ACCEPTABLE MANUFACTURERS

A. Specified Technologies, Inc. (STI)

B. 3M

C. Hilti, Inc.

2.3 FIRESTOP MATERIALS

A. Firestop Mortar

B. Intumescent Firestop Sealants and Caulks

C. Elastomeric Firestop Sealants and Caulks

D. Endothermic Firestop Sealants and Caulks

E. Firestop Putty

F. Rough-in Box Inserts

G. Firestop Pillows/Blocks

H. Fire Rated Pathways

I. Firestop Grommets

J. Firestop Collars

K. Wrap Strips

L. Cast in Place Devices

M. Firestop Foams

N. Composite Sheets

O. Intumescent Gaskets

PART 3 - EXECUTION

3.1 GENERAL

A. In an occupied building, permanent firestopping shall be installed within 24 hours of penetrating a fire rated assembly. If permanent firestopping cannot be installed within this time period, temporary firestop pillows/blocks are permitted, where installation allows, until permanent firestop materials can be properly installed.

3.2 INSPECTION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until the Contractor, in a manner acceptable to the Architect has corrected unsatisfactory conditions.

B. Verify that environmental conditions are safe and suitable for the installation of the firestop products.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified elsewhere whether or not firestopping is indicated and, if indicated whether such material is designed as insulation, safing, or otherwise.
2. All firestopping shall be installed in accordance to the UL rated system designed for the application.
3. Grout, Mortar or Gypsum based products shall not be installed in lieu of firestopping material specified herein.
4. All smoke walls (smoke barriers, smoke partitions, etc.), rated or non-rated, shall be firestopped with systems designed to maintain a minimum 1 hour rating or that which is equal to the rating of the wall.

B. Penetrations - Provide firestopping as follows:

1. Where penetrations pass through one or both surfaces of a fire rated floor or wall.
2. Where a penetration occurs through fire rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition.
3. Except for slab on grade, where penetrations pass through a non-fire rated floor.
4. The requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening. Upon installation of cabling through sleeve, firestop the remaining open area within the conduit.

C. Where demolition has occurred in rated walls, floors and assemblies, the material used to patch the opening shall match the material used for the assembly construction. Firestopping materials may be utilized upon approval of Architect and Engineer. Materials used shall be provided with submittals. Work performed shall be the responsibility of the Contractor whose work was removed, performed by the appropriate trade.

3.4 PREPARATION

A. Surface to receive firestop shall be free of dirt, dust, grease, oil, oil from release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items.

B. Substrate shall be frost free.

3.5 INSTALLATIONS

A. General

1. Sleeves and core-drilled holes shall be sized at least 1-1/2" larger in diameter than penetrating items.
2. Installation of firestops shall be performed by applicators/installers qualified and trained by the Manufacturer. Installation shall be performed in strict accordance with the Manufacturer's detailed installation procedures.
3. Apply firestops in strict accordance with UL rated system designs, and Manufacturer's recommendations.
4. Coordinate with all other trades to assure that all items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other Construction which would conceal penetrations are not erected prior to the installation of firestop.
5. Gun grade sealants and putties shall be tooled into place to insure proper adhesion to penetrations and surrounding surfaces.
6. Where existing penetrations are reused that contain remnants of existing firestop products remain, remove all existing firestopping.

B. Dam Construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating.
2. Placement of dams shall not interfere with functions or adversely affect the appearance of adjacent construction.

C. Field Quality Control

1. Install work in full accordance with rules, regulations, and safety requirements of Federal, State, County and City authorities having jurisdiction over premises. Do not construe this as relieving Contractor from compliance with any requirements of the Specifications which are in excess of Code requirements and not in conflict therewith.
2. Correct unacceptable firestopping and provide additional inspection to verify compliance with this Specification at no additional cost.
3. Finish surfaces of firestopping that is to remain exposed in the completed work to a uniform and level condition.

3.6 LABELING

A. Where firestopping installations occur, Contractor shall provide a label adjacent to each penetration. Label shall include:

1. UL rated system used.
2. Date of installation.
3. Name of installing Contractor

B. Labels shall be furnished by the firestop manufacturer.

END OF SECTION

SECTION 262100 - POWER DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Power Distribution Equipment

B. Lighting and Appliance Branch Circuit Panelboards

C. Safety Switches

D. Motor Starters

PART 2 - PRODUCTS

2.1 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS (208Y/120 OR 240 VOLT RATED)

A. Furnish and install branch circuit panelboards equipped with circuit breakers, with frame and trip ratings listed on the Drawings.

B. Panelboard bus structure and main lugs or main circuit breaker shall have current ratings as shown on the Drawings. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or phase sequence type and shall accept bolt-on circuit breakers. All current carrying parts of the bus structure shall be tin-plated aluminum. Each panelboard shall be fully bussed, ready to accept future devices. Each panelboard shall contain a grounding bus. Each panelboard shall contain a 100% rated neutral bus.

C. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel shall be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door.

1. Fronts shall have "door-within-door" trim, hinged box to front type with latch on outer door. Fronts shall have an inner door over the branch circuit disconnect area secured with one latch with lock. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position.

D. Locks shall be flush cylinder tumbler type with catch and spring loaded door pull. All panelboard locks shall be keyed alike.

E. Each panelboard, as a complete unit, shall have a minimum symmetrical short circuit current rating no less than that required by the overcurrent protective devices specified elsewhere. This rating shall be established by testing with the overcurrent devices mounted in the panelboard in accordance with Underwriters Laboratories Standard UL 67. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage.

1. Circuit breakers shall be fully rated. Series ratings are not permitted unless otherwise indicated on the Drawings.

F. Each panelboard served directly by a transformer secondary shall have a main circuit breaker or other main overcurrent protection, sized in accordance with Article 240 of the National Electrical Code.

G. Panelboards shall be listed by Underwriters Laboratories and bear the UL label. When required, panelboards shall be suitable for use as service equipment. Panelboards shall be as manufactured by Eaton, Schneider Electric, Siemens, or ABB.

2.2 SAFETY SWITCHES

A. Safety switches shall be heavy duty fusible or nonfusible type as indicated on the Drawings, and shall be suitable for the voltage and current ratings as shown on the Drawings. Safety switches shall be UL Listed for their application.

B. Switches shall have switch blades which are visible in the "Off" position when the door is open. Switches shall have removable arc suppressors, where necessary, to permit easy access to the line side lugs. All current carrying parts shall be plated.

C. Switches shall have an integral quick-make, quick-break operating handle mechanism. Switches shall have a dual cover interlock to prevent opening of the switch door in the "ON" position or to prevent closing of the switch mechanism with the door open. Handle position shall indicate if the switch is "ON" or "OFF".

D. Fuse holders shall accept only Class J, R or L fuses.

E. Indoor enclosures shall be NEMA 1. Exterior enclosures shall be NEMA 3R. NEMA 1 enclosures shall be code gauge UL 98 sheet steel, treated with a rust inhibiting phosphate primer and finished in gray baked enamel. Enclosures shall be provided with padlocking provisions.

F. Acceptable manufacturers shall be: Eaton, Schneider Electric, Siemens, or ABB.

2.3 MOTOR STARTERS - THREE PHASE

A. All motor starters shall be combination type, unless otherwise noted on the Drawings. Starters shall include a fusible safety switch, a starter with three overload devices, and a control circuit transformer. The enclosure shall be NEMA type 1, unless otherwise indicated on the Drawings. Combination starters shall be manufactured in accordance with the latest published NEMA standards, sizes and horsepower ratings, size 0 minimum. Combination starters shall be full voltage - non reversing, designed for across the line operation unless otherwise indicated on the Drawings.

B. The fusible safety switch shall feature visible blade construction and shall have fuse holders. The switch handle shall control the disconnecting device with the door open or closed. The switch handle shall clearly indicate whether the disconnect device is "ON" or "OFF". The switch handle shall permit locking in the "OFF" position.

C. The starter coil shall be of molded construction. Each starter shall have one melting alloy type overload relay per phase, sized according to NEMA Standards for the motor type, horsepower and voltage applied. The thermal elements shall be of one-piece construction and interchangeable. The starter shall be inoperative if a thermal unit is removed.

D. Each combination starter shall include a control circuit transformer with a 120 volt secondary connection unless otherwise indicated on the Drawings. One side of the secondary winding shall be fused and the other side grounded. Both primary windings shall be fused.

E. The enclosure door shall be closed to permit operation of the safety switch. A defeater screw shall permit opening of the door with the switch "ON".

F. Starters shall have a green running pilot light, a hand-off-automatic selector switch and a minimum of two normally open and two normally closed auxiliary contacts, ready for control wiring connections. Verify the exact type and number of additional auxiliary contacts with the HVAC and Plumbing Contractor. Auxiliary contacts shall be supplied as indicated on the Temperature Control Drawings, or as directed by the HVAC and Plumbing Contractor.

G. The voltage, phase, and horsepower of motors requiring motor starters are indicated on the Drawings. Verify the characteristics of each motor with the HVAC and Plumbing Contractor before installation. Fuse size shall be as indicated on the Drawings.

H. Starters shall be as manufactured by Eaton, Schneider Electric, Siemens, or ABB.

I. Provide single phase combination starters if indicated on the Drawings. Single phase combination starters shall have similar characteristics as specified for three phase starters, as applicable.

2.4 MATCHING EXISTING OVERCURRENT PROTECTION DEVICES

A. New circuit breakers or fusible switches installed in existing panels shall match the existing in type, manufacturer (if possible), and short circuit ratings.

PART 3 - EXECUTION

A. LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS Panels shall be mounted so that the top of the cabinet is at 6'-0" above floor.

B. A glazed directory frame shall be provided inside each panel door and shall be of sufficient size to give a complete description of each circuit. Typed directory cards shall be provided with a detailed listing of each circuit served, including descriptions of the load and location (room numbers as applicable). Panelboard schedules included with the Contract Documents are not intended nor are they permitted to be used to meet this requirement.

C. Panels indicated with double lugging or oversized conductors on the Drawings shall be installed with an oversized tub or a wireway or splice box (flush mounted if required).

D. The Contractor shall balance the continuous load on each panel when the work is complete.

E. The branch circuit numbers used on the Drawings shall be applied for the construction. However, at the completion of the work, circuit number adjustments shall be made as required to provide balanced phase loading on each panel. Balancing required shall be no greater than 15%. Any rebalancing performed shall also require relabeling of the conductors.

F. Flush mounted panels shall be installed with a minimum of three empty 3/4" conduits stubbed up to the nearest accessible ceiling space for convenient future expansion.

G. Spare circuit breakers shall be identified as such on the panel directory cards and shall be left in the "OFF" position.

H. Provide engraved nameplates with information as shown on the Drawings.

I. Where wireways are installed to serve multiple branch panelboards, the conduits entering the panelboard shall be of size and quantity to allow the panel to be filled to maximum capacity based on total available breaker space and be no more than 50% filled.

END OF SECTION

SECTION 262115 - GROUNDING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Grounding and Bonding Equipment

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. Submittals

1. Submit product data of manufactured materials.

1.3 QUALITY ASSURANCE

A. UNDERWRITERS LABORATORIES INC. (UL)

1. UL 467 - Grounding and Bonding Equipment
2. UL 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors

B. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS

1. NFPA 70 - National Electrical Code Article 250

1.4 RECORD DRAWINGS

A. Contractor shall provide electronic drawings showing all the applicable components of the Grounding System, all grounding bus bars, termination points to main electrical grounding electrode.

B. All as-built information shall be submitted as described in General Provisions.

PART 2 - PRODUCTS

2.1 GROUNDING

A. Ground all electrical system conduits, raceways, busways, cable trays, motors, panels, cabinets, fixtures, metal boxes, and other exposed non-current carrying metal parts of electrical equipment in accordance with all provisions of the National Electrical Code, State Building Code and local or regional codes.

B. Grounding of the electrical system shall be by means of an insulated grounding conductor installed with feeder and branch circuit conductors in all conduits. Grounding conductors shall be sized in accordance with NEC Article 250.122 and shall run from the grounding bus of serving panel to the grounding bus of served panel, to the grounding screws of receptacles, to lighting fixture housings, to the grounding screws of light switches, to metal boxes and to the metal enclosures of service equipment.

1. Install bonding jumpers across all building expansion joints, and across all conduit, busway and cable tray expansion fittings.
2. Where grounding conductors are subject to mechanical damage, protect such conductors by encasement in concrete or installation in a rigid metallic raceway.

C. Extension of existing grounding system to new electrical equipment shall be by means of an insulated grounding conductor installed with feeder and branch circuit conductors in all conduits. Grounding conductors shall be sized in accordance with NEC Article 250.122 and shall run from the grounding bus of serving panel to the grounding bus of served panel, to the grounding screws of receptacles, to lighting fixture housings, to the grounding screws of light switches, to metal boxes and to the metal enclosures of service equipment.

2.2 DELIVERY, STORAGE AND HANDLING

A. Provide marking on wire and cable in accordance with applicable standards.

B. Ship each item of equipment and materials securely wrapped, packaged and labeled for safe handling in shipment and to avoid damage.

C. Store equipment and materials in a secure and dry storage facility remotely or on project site.

PART 3 - EXECUTION

3.1 GROUND CONNECTIONS

A. All connections shall be made in accordance with the manufacturer's requirements. All connections shall be cleaned and coated with a bitumastic epoxy before backfilling per manufacturer's requirements.

B. Splice connections shall be made in accordance with manufacturer's requirements.

3.2 LABELING

A. Refer to grounding detail for additional labeling requirements.

END OF SECTION

SECTION 262235 - OVERCURRENT PROTECTION DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Fuses

B. Molded Case Thermal Magnetic Circuit Breakers

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. Submit wiring diagrams including interconnection wiring between components and remote devices.

D. Installation, operation and maintenance manual with pre-startup, detailed wiring, connections and diagrams, and instructions.

E. Field Test Results as specified herein.

1.3 QUALITY ASSURANCE

A. The overcurrent protection devices in this Specification shall be designed and manufactured according to the latest revision of the following standards (unless otherwise noted):

1. NEMA AB 3: Molded Case Breakers
2. UL 248: Low Voltage Fuses
3. UL 489: Molded Case Circuit Breakers, Molded Case Switches and Circuit Breaker Enclosures

1.4 WARRANTY

A. Manufacturer shall warrant overcurrent protection devices to be free from defects in materials and workmanship for one year from date of Owner's formal acceptance.

PART 2 - PRODUCTS

2.1 FUSES

A. Approved Manufacturers:

1. Bussman
2. Mersen
3. LittleFuse

B. The Electrical Contractor shall provide a complete set of fuses for all fusible equipment on the project.

C. All fuses shall be UL Listed, current limiting with 200,000 RMS amperes interrupting capacity, unless otherwise indicated on the Drawings or in the Specifications.

D. Fuses rated 600 amperes or less, 250 volts or less, serving power distribution system and mechanical equipment shall be UL Class RK-1: Bussmann dual element, time delay "LOW PEAK", type LPN-RK; Mersen type A2DR; or LittelFuse type LLNRK.

1. UL Class J fuses are also acceptable if necessary for dual switch applications or where required for equipment fault protection.

E. Fuse Application for Motor Circuits and Motor Control Circuits:

1. Motor protection dual element fuses installed in individual branch circuits shall be sized at 125% of motor nameplate current rating or the next higher standard fuse size.
2. Where excessive ambient temperature, high inertia motor loads, or frequent "on-off" cycling require larger fuses, consult the Engineer.
3. Provide fuse reducers where fuse gaps are larger than fuse dimension.
4. For motor control circuits, provide UL Class CC fuses, sized for maximum values allowed per NEC Article 430.72.

2.2 MOLDED CASE THERMAL MAGNETIC CIRCUIT BREAKERS

A. For approved manufacturers, refer to panelboard specifications in the Power Distribution Equipment Section.

B. New circuit breakers installed in existing lighting and appliance or power distribution panelboards shall match the existing in type, manufacturer (if possible), and short circuit ratings.

C. For lighting and appliance panelboards and power distribution panelboards, provide molded case thermal magnetic circuit breakers with frame and trip ratings listed on the Drawings. The molded case circuit breakers shall provide for the inverse time delay overload and instantaneous short circuit protection by means of a thermal magnetic element.

D. The circuit breaker ampere rating shall be clearly visible without removing the panel cover.

E. Circuit breakers shall be single pole or multi-pole with an integral crossbar to assure simultaneous opening of all poles.

F. Circuit breakers shall have an over-center, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication.

G. Handles shall have "ON", "OFF" and "TRIPPED" positions.

H. Circuit breakers shall be fully rated. Series ratings are not permitted.

I. For nominal 208Y/120 volt or 240 volt systems, provide minimum symmetrical short circuit current rating of 10,000 amperes, unless otherwise noted on the Drawings.

J. For nominal 480Y/277 volt systems, provide minimum symmetrical short circuit current rating of 14,000 amperes, unless otherwise noted on the Drawings.

K. For circuit breakers provided in power distribution panelboards, minimum symmetrical short circuit current rating shall be 22,000 amperes, unless otherwise noted on the Drawings.

L. Circuit breakers shall include factory installed mechanical lugs. Lugs shall be UL listed and rated 75 degrees C.

M. Special Requirements:

1. Circuit breakers serving high intensity discharge lighting circuits shall be "HID" rated for use on high intensity discharge lighting systems.
2. Circuit breakers serving HVAC loads shall be "HACR" rated.

PART 3 - EXECUTION

3.1 DELIVERY, HANDLING AND STORAGE

A. Deliver, store, protect, and handle devices and components in accordance with recommended practices listed in manufacturer's installation manuals.

B. Store devices and components in a clean, dry space. Maintain factory protection or cover with plastic to keep out dirt, water, construction debris, etc until time of installation.

3.2 FUSES

A. Fuses shall not be installed until equipment is ready to be energized. All fuses shall be of the same manufacturer to assure selective coordination.

B. Spare fuses amounting to 20% (minimum of three) of each type and rating shall be supplied by the Electrical Contractor.

C. Field verify the exact fuse size required for all mechanical and building equipment with the nameplate data of the equipment prior to procurement. Advise the Engineer if the equipment nameplate fuse size differs from the size indicated on the Drawings.

D. Fuses shall be turned over to the Owner upon project completion. .

END OF SECTION

SECTION 265100 – LED LUMINAIRES

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Interior Luminaires

B. Exterior Luminaires

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 DESCRIPTION OF WORK

A. Luminaires shall be provided as specified in the Luminaire Schedule or as indicated on the Drawings complete with lamps, power wiring, and control for a fully operational system. Contractor is responsible for providing proper mounting accessories. Contractor shall refer to this Specification for LED and driver requirements. Refer to the Drawings and Specifications for control requirements. Submittals shall include product information for luminaires. Where a catalog number and a narrative or pictorial description are provided, the written description shall take precedence. If equal or alternate luminaire Manufacturers are not indicated, then the luminaires shall be provided as specified. The Engineer is not responsible for the performance of substituted luminaires approved by the Architect or Owner without the consent of, or review by, the Engineer.

1.4 QUALITY ASSURANCE

A. Codes and Standards

1. Luminaires shall be installed in accordance with Article 410 of the National Electrical Code and shall be grounded as required by the National Electrical Code. The Contractor is responsible for proper installation of luminaires, including verification that luminaires are installed according to their intended use. Any conflicts regarding actual architectural conditions shall be brought to the attention of the Architect and Engineer immediately.
2. All luminaires and assembled components shall be new, of good quality, and bear the label of and be approved by UL laboratories for the applicable location and conditions (wet, damp, dry, etc.).
3. All luminaires shall meet all required local, state and/or national building, electrical and energy codes and regulations.

PART 2 - PRODUCTS

2.1 LIGHT EMITTING DIODES (LEDS):

A. Refer to the Luminaire Schedule for additional requirements.

B. General Requirements:

1. All products shall be tested by a Nationally Recognized Testing Laboratory (NRTL) in accordance with IES LM-79 testing methods and shall carry a UL or ETL label. Luminaire Manufacturer shall confirm in writing that the LEDs within the luminaire will not exceed the maximum temperature to which the LED die was tested using IES LM-80 testing methods.
2. All LEDs must be batch sorted for color and brightness visual consistency, and must be manufactured by a reputable LED Manufacturer, such as Philips Lumileds, Osram Sylvania, Nichia, Cree or approved equal. All luminaires of the same type shall be supplied at the same time and shall come from the same batch. Spare luminaires shall be provided from the same batch.
3. Color Rendering Index (CRI): Minimum CRI of 75.
4. All interior LEDs shall be 3500 K.
5. All exterior LEDs shall be 3500 K.
6. All LED components shall be mercury and lead-free.
7. All LED luminaires shall be subjected to the following JEDEC Reliability Tests for Lead-free Semiconductors: HTOL, RTOL, LTOL, PTMCL, TMSK, Mechanical Shock, Variable Vibration Frequency, SHR, Autoclave.

C. Thermal Management:

1. Luminaire Manufacturers shall adhere to device Manufacturer guidelines, certification programs, and test procedures for thermal management.
2. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the Luminaire over the expected useful life. The LED Manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
3. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
4. The Luminaire shall have a minimum heat sink surface such that LED Manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature. The heat sink material shall be aluminum.

D. Special Warranty: Provide a written warranty indicating that the complete system (LED luminaires, drivers and power supplies) shall carry a minimum 5-year warranty.

2.2 LED DRIVERS

A. Non-dimming LED drivers shall meet the following requirements:

1. Minimum Efficiency: 85%
2. Starting Temperature: -40° C
3. Input Voltage: 120 to 480 volts ±10%, single phase
4. Power Factor (PF): ≥ 0.90
5. Total Harmonic Distortion (THD): $\leq 20\%$
6. Sound Rating: Class A
7. Surge Protection: The system must survive 250 repetitive strikes of "C Low" (C Low – 6kV/1.2 x 50µs, 10kA/8 x 20µs) waveforms at 1 minute intervals with less than 10% degradation in clamping voltage. "C Low" waveforms are as defined in IEEE/ASNI C62.41.2-2002, Scenario 1 Location Category C.
8. Power supplies can be UL Class I or II output.

B. Dimming drivers shall be similar to non-dimming drivers, with the following additional requirements.

1. 0-10V dimming drivers shall dim to a minimum for 10%, and shall be type as recommended by manufacturer unless noted otherwise on the contract documents.
2.
3. Drivers shall be compatible with dimmer control specified in the Luminaire Controls Specification Section.

C. Drivers shall comply with FCC 47 cfr Part 18 non-consumer RFI/EMI standards.

D. Provide low temperature drivers for LED luminaires in exterior applications or in unheated areas.

2.3 EXTERIOR POLE LUMINAIRES

A. Optical assemblies shall be provided with discreet over optical elements to provide IES Type II, III, IV or V distributions. Additional distributions for spill light control shall be utilized when light trespass must be mitigated where indicated on the Drawings. Mitigation must take place without external shielding elements.

B. Optical assemblies shall have a minimum efficiency of 85% regardless of distribution type. For Type II and Type III distributions street side efficiencies shall be a minimum of 80%. All LEDs and optical assemblies shall be mounted parallel to the ground. All LEDs shall provide the same optical pattern such that catastrophic failures of individual LEDs will not constitute a loss in the distribution pattern.

C. The illuminance shall not decrease by more than 30% over the expected operating life. The measurements shall be calibrated to standard photopic calibrations.

D. Backlight-Uplight-Glare: The luminaire shall not allow more than 10 percent of the rated lumens to project above 80 degrees from vertical. The luminaire shall not allow more than 2.5 percent of the rated lumens to project above 90 degrees from vertical. Backlight and Glare ratings as per luminaire schedule and calculated per IES TM-15.

PART 3 - EXECUTION

3.1 LUMINAIRE SUPPORTS

A. All boxes upon with luminaires are to be installed shall be equipped with 3/8 inch luminaire studs. Luminaires which weigh over 50 lbs. shall be supported independently of the box, unless the box is listed for the weight to be supported.

B. Boxes serving recessed luminaires in accessible ceilings shall be capable of being accessed through the ceiling opening. Install a maximum 6 feet of 1/2 inch flexible metal conduit (or MC cable) or between the rigidly supported box and the luminaire housing. The box shall be located a minimum of one foot from the luminaire housing.

C. Surface mounted luminaires mounted on ceilings other than accessible lay-in ceiling systems, or to the building structure, shall be securely supported in a manner approved by the Architect. Mounting shall also be in accordance with Article 410 of the National Electrical Code, and as recommended by the luminaire Manufacturer.

D. Recessed luminaires shall be provided with mounting accessories compatible with the ceiling types installed. Plaster frames shall be furnished for each recessed luminaire installed in plaster or dry wall type ceilings. Verify all ceiling types with the Division 1 Contractor and with the Architectural reflected ceiling plans prior to submitting shop Drawings.

E. Recessed luminaires in accessible lay-in ceiling systems shall be supported as follows:

1. The grid system tees shall be supported at each corner of each luminaire with a suspended ceiling support wire up to a building structural member, or up to the structural deck. It is the responsibility of the Electrical Contractor to include such supports in Bid regardless of which Division installs the supports.
2. Each luminaire shall also be securely fastened to the grid system tees by mechanical means, such as bolts, screws, rivets or by clips identified for use with the type ceiling framing member installed.

3.2 CONNECTIONS AND INSTALLATION REQUIREMENTS

A. Connections to recessed and surface luminaires installed in drywall or inaccessible ceilings shall be made utilizing 1/2” flexible metal conduit or MC cable from luminaire to nearest junction box located in an accessible ceiling area or at access panel locations as approved by Architect. Manufactured wiring systems are not acceptable. Complete installation shall require ability to access connection points and replace wiring from accessible junction boxes to any luminaires.

3.3 MISCELLANEOUS

A. At the conclusion of the Work, each luminaire shall be in good operating condition.

B. Remote drivers shall be grounded as recommended by the luminaire Manufacturer.

C. Provide wiring from low voltage dimmers to luminaires as recommended by the Manufacturer.

3.4 EXTERIOR LUMINAIRES

A. Bases for exterior pole or post luminaires shall be formed as indicated on the Drawings with reinforced concrete. Crown top of base and weather seal exposed concrete.

B. Provide low temperature drivers for all exterior luminaires and for luminaires in unheated rooms or areas.

C. Adjustable exterior luminaires shall be aimed by the Contractor at night for optimum coverage of their task, to the satisfaction of, and under the direction of the Architect.

D. Provide in-line fuses in phase conductors of pole mounted exterior luminaires as follows:

1. Where more than one (1) luminaire on a pole is installed, each luminaire shall be fused at the base independently.
2. The fuse holder shall be Bussman in-line, type HEBA, or equal, with an approved manufactured rubber cover"boot" to be inserted over the crimped area of the fuse holder.
3. The in-line fuse holder shall be located at the hand hole of the pole.
4. Luminaires that may contain an internal fuse-holding device shall not be approved as the disconnecting means and/or recognized as the proper protection device of said luminaires.
5. Roadway luminaires shall be provided with disconnect kits to interupt power in the event of pole breaking. Fused disconnects shall be Homac, flood-seal Y-type, fused, or equal.
6. Fuse sizes shall be 3 times the amperage rating of the luminaire, or as recommended by the Manufacturer.

3.5 EXISTING LUMINAIRES

A. Existing luminaires in the remodeled areas as shown on the Drawings being reused, or relocated, shall be refurbished as follows:

1. Luminaires shall be thoroughly cleaned.
2. Broken lenses shall be replaced.

B. If existing luminaires to be reused or relocated are defective or inoperable, bring this condition to the attention of the Architect before refurbishing work is done, and before relocation.

3.6 AIMING OF ADJUSTABLE LUMINAIRES

A. All luminaires (including"Normally-Off" emergency luminaires) that are capable of being aimed shall be aimed by the Contractor for the optimum coverage of their task, to the satisfaction of, and under the direction of the Architect.

3.7 ADDITIONAL MATERIALS

A. The Electrical Contractor shall furnish additional materials described below that match the products installed. These materials shall be packaged with protective covering for storage, and shall be clearly labeled to indicate their use. The Contractor shall coordinate the designated storage location with the Owner on site upon project completion.

1. Spare ballasts, LED drivers, LED power supplies, etc., amounting to 1% (minimum of 2) of each type and rating installed.
2. Spare diffusers and lenses amounting to 1% (minimum of 2) of each type and rating installed.

END OF SECTION

SECTION 265200 - LUMINAIRE CONTROL

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Toggle Switches

B. Dimmers

C. Luminaire Control Occupancy Sensors

D. Luminaire Control Occupancy Sensors with Dimming

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. Submittals shall include all installation drawings and wiring diagrams where applicable as required for a complete installation. Wiring diagrams shall detail all system interconnections. Provide an itemized bill of materials and product data sheets.

1.3 DESCRIPTION OF WORK

A. Occupancy Sensors

1. Occupancy sensors shall be provided as indicated on the Drawings. Contractor is responsible for providing proper mounting accessories. Submittals shall include product information. If alternate occupancy sensor Manufacturers are not indicated, then the devices shall be provided as specified. The Engineer is not responsible for the performance of substituted devices approved by the Architect or Owner without the consent of, or a review by, the Engineer.

1.4 QUALITY ASSURANCE

A. Codes and Standards

1. Occupancy sensors shall be installed in accordance with Article 410 and Article 411 of the National Electrical Code and shall be grounded as required by the National Electrical Code. The Contractor is responsible for proper installation, including verification that devices are installed according to their intended use. Any conflicts regarding actual architectural conditions shall be brought to the attention of the Architect and Engineer immediately.
2. Occupancy sensors shall comply with NEMA WD-7 .

1.5 WARRANTY AND MAINTENANCE CONTRACT

A. Provide Manufacturer's 5 year parts warranty.

B. Warranties shall commence upon project closeout and final acceptance by the Owner.

1.6 OWNER TRAINING

A. A representative of the devices shall train the Owner's personnel on operation and maintenance of the devices. Programming shall be provided as coordinated with the Owner.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Toggle Switches

1. Local toggle switches shall be 20 ampere, 120/277 Volts, AC specification grade, with grounding terminal:

a. Single pole - Hubbell HBL1221 .
b. Three way - Hubbell HBL1223 .
c. Four way - Hubbell HBL1224 .

2. Pass and Seymour #PS20AC Series, Cooper #222 Series or Leviton #122 Series shall be acceptable equivalent toggle switches.
3. For other types of toggle switches specified, the equivalent series by Pass and Seymour, Cooper or Leviton shall be acceptable.

B. Dimmers

1. Dimmers shall be Lutron Maestro Series, unless noted otherwise herein.

a. **0-10V** LED driver dimmers shall be Lutron Diva series, for 3-way or single-pole, 8A or 50mA maximum control current, #DVSTV-XX. Control provides dimming signal only. For dimming with on/off switching, single pole only, 30mA maximum control current, #DVSCTV-XX. Provide Lutron Power Pack #PP-120H for 120V or .

2. Equivalent dimmers manufactured by Crestron, Cooper Wiring Devices "Aspire" Series or Leviton "Vizia" Series shall be acceptable.

C. Luminaire Control Occupancy Sensors (Standard Applications)

1. Devices shall be manufactured by Legrand (Wattstopper), with model numbers as indicated. Alternate devices manufactured by Lutron, Crestron, Leviton, Hubbell or Eaton Lighting Controls (Greengate) are acceptable, and shall meet or exceed the performance and area of coverage of the specified sensors.
2. Sensors shall be manual on, unless otherwise noted on the Drawings or within these Specifications. Contractor shall coordinate all time delays with Owner.
3. Sensors shall be instant (automatic) on, in all public corridors and stairwells, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety and security of the room or building occupant(s).
4. Passive Infrared Sensors

a. Type PS: Wall switch sensors where indicated on Drawings shall be 800 Watts, 120 or 277 volt with manual on/off override control, two-level detection pattern minimum, adjustable sensitivity, and 180 degree horizontal coverage for 900 square foot maximum area. Sensors shall be:

1) Wattstopper: #WS-250

5. Dual Technology Sensors

a. Type DC: Ceiling mounted sensors where indicated on Drawings shall operate at 24 Volts DC from remote power packs. Sensors shall have (1) NO/NC isolated relay rated for 1 amp at 24 volts DC and 360°, 1,000 square foot extended range lens with a nine-level detection pattern. Sensors shall be:

1) Wattstopper: #DT-300

6. Remote Power Packs

a. Power packs shall have universal voltage capabilities and have an integral transformer relay system for 24 VDC output at 225mA, auto-on or manual-on operating mode, output contact rated at 20A for incandescent loads and 20A for electronic ballast loads. Power packs shall be #BZ-150.
b. Refer to Manufacturer's installation wiring diagrams for exact wiring and installation requirements.

D. Luminaire Control Occupancy Sensors with Dimming

1. Devices shall be manufactured by Lutron Technologies, with model numbers as indicated. Alternate devices manufactured by Crestron are acceptable, and shall meet or exceed the performance and area of coverage of the specified sensors.
2. Sensors shall be manual on, unless otherwise noted on the Drawings or within these Specifications. Contractor shall coordinate all time delays with Owner.
3. Passive Infrared Sensors

a. Type PSD: Wall dimmer sensors where indicated on Drawings shall be 0-10V, 8A with two-level detection pattern, adjustable sensitivity, and 180 degree horizontal coverage for 900 square foot maximum area. Sensors shall be manufactured by Lutron Technologies, #MS-Z101-XX.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Adjacent devices of the same voltage class shall be mounted in ganged boxes. Provide a common coverplate.

B. Toggle switches, Occupancy sensors, and Dimmers shall be permanently marked to indicate the panel and circuit number of the device. Refer to Basic Materials and Methods Specification Section for additional information.

C. Ceiling mounted sensors shall not be installed within 6 feet of an HVAC diffuser , as this may result in inaccurate detection.

3.2 MISCELLANEOUS

A. Provide wiring of devices as recommended by the Manufacturer. Low voltage cabling shall be supported above accessible ceilings with J-hooks, and shall be kept separate from other system wiring.

END OF SECTION

SECTION 265225 - LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Zone Controllers

B. Relay Panels

C. Low Voltage Control Devices

D. Lighting Control Management System Software

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical General Provisions

B. Electrical Basic Materials and Methods

C. Luminaires

1.3 DESCRIPTION OF WORK

A. Provide a complete Networked Lighting Control System as shown on the Drawings and specified herein.

1. The System shall be low voltage and modular utilizing standard networked digital communication techniques. The features and capacities described in this Specification are required as a minimum.
2. The System shall include all hardware, raceways, interconnecting wiring and software to accomplish the intent of this Specification and the Contract Drawings, as required for a complete and operational system.
3. Include all communications hubs, gateways, controllers, splitters, low voltage ports and/or connectors, and all other networking appurtenances as may be required.

B. Lighting Control System shall provide for lighting control that is time-based, sensor-based (both vacancy and daylight type) and manual. Lighting control shall include on/off and full-range dimming.

C. All system devices shall be networked together, enabling digital communications between devices that are individually addressed. The network architecture shall be capable of enabling control functions for stand-alone rooms even if the greater network connectivity is disabled or lost. The network architecture shall facilitate remote operation via computer connection to Owner's data network or Building Automation System (BAS).

1.4 QUALITY ASSURANCE

A. Provide hardware that is designed, tested, manufactured and warranted by a single Manufacturer.

B. Codes and Standards

1. All devices shall be installed in accordance with Article 410 and Article 411 of the National Electrical Code and shall be grounded as required by the National Electrical Code. The Contractor is responsible for proper installation, including verification that devices are installed according to their intended use.
2. The Low Voltage Lighting Control system shall be UL listed under:

    a. UL 20 - Standard for Safety for General use Snap Switches
    b. UL 508 - Standard for Industrial Control Equipment
    c. UL 924 - Emergency Lighting and Power Equipment

3. Conflicts regarding actual architectural conditions shall be brought to the attention of the Architect and Engineer immediately.

C. Acceptable Manufacturers of Networked Lighting Control System

1. Acuity Brands - nLight System
2. Crestron - Green Light System
3. Wattstopper - DLM System
4. Hubbell - NX Distributed Intelligence System
5. Lutron - Quantum System

1.5 PROJECT SUBMITTALS

A. Submittals shall include all Installation Drawings and Wiring Diagrams required for a complete system installation. Submittals shall include the following:

1. Itemized Bill of Materials and Product Data Sheets.
2. Floor plans that detail all system devices and components.
3. Wiring Diagrams that detail all system interconnections.
4. Relay panel schedules indicating circuits connected, inputs assigned, and area controlled.

B. During the submittal process, engraving descriptions shall be provided by the Contractor to the Manufacturer for each wall station button prior to fabrication. Descriptions shall be coordinated with the Owner and Architect.

1.6 WARRANTY

A. A written 36-month Manufacturer's Warranty shall be supplied by the Manufacturer.

B. Warranties shall commence upon project closeout and final acceptance by the Owner.

C. The Manufacturer shall supply telephone support at no additional cost to the Owner for the duration of the warranty period.

1.7 OWNER TRAINING

A. A representative of the system Manufacturer shall supervise final connections, test, program, and adjust the entire system, and train the Owner's personnel on operation and maintenance of the system. The training session shall be video recorded by the Contractor for future Owner use. Programming shall be provided as coordinated with the Owner.

1. A minimum of four hours of instruction shall be provided in one day.
2. A second follow up training session shall be provided within sixty to ninety days after final acceptance. Up to four hours of additional instruction shall be provided.

PART 2 - PRODUCTS

2.1 SYSTEM OPERATION

A. Each controlled lighting branch circuit or lighting branch sub-circuit zone shall be connected to a relay and/or dimmer as specified herein and as shown on the Drawings.

B. The relay portion and/or dimmer portion of the Zone Controller shall be provided as required to control the luminaires as scheduled or as otherwise indicated on the Drawings. Zone Controller (ZC) operational characteristics:

1. Relay shall switch a 120V or 277V branch circuit in accordance with the relay performance characters specified herein.
2. Each relay shall be capable of being controlled through a time clock signal provided within the lighting control network.
3. Each relay shall be capable of being controlled from the following local low voltage control devices:

   a. Momentary pushbutton wall station
   b. Room vacancy sensor

4. Each relay shall also be capable of being controlled from the following system-wide control devices:

   a. Time clock controller
   b. Exterior photosensor
   c. Manual override switch

5. Dimmer shall be 0-10 volt LED luminaire dimming unless otherwise noted on the Drawings.
6. Each dimmer shall be capable of being controlled from the following local low voltage control devices:

   a. Momentary up/down pushbutton wall station
   b. Daylighting sensor

7. ZC may be an individual unit or part of a multiple-zone assembly if desired to facilitate installation.

C. System-Wide Control

1. Time-based automatic control for operating groups of relays (or all relays) shall be as scheduled on the Drawings and as specified herein. Time period shall be coordinated with Owner.

a. Multiple loads shall not operate simultaneously, even when triggered by the same switch input or time schedule. Each load operation shall be staggered to reduce the inrush effects on the power system. Sequencing shall be programmable with no more than 5 relays switching per second.

2. Manual override switches shall turn on groups of relays on for a period of one hour.

a. Interior lighting circuits shall flash twice for a period of five minutes prior to the circuits being shut off. Time period shall be programmable.

3. Contact closure of the Fire Alarm System or Security and Access Control System shall automatically control groups of relays (or all relays) as scheduled on the Drawings and as specified herein.

D. To avoid unnecessary confusion to the users, the system shall use a "last action" priority scheme. Time schedules and switch input overrides shall each cancel the action of each other. Momentary and maintained switches operating on the same load shall also cancel each other's actions.

E. Exterior photosensor shall automatically control groups of relays (or all relays) associated with exterior lighting. Photosensor shall be used in conjunction with time-based automatic control.

2.2 PERFORMANCE REQUIREMENTS

A. Relays

1. Relays shall be fully rated at 20 amps output continuous duty for LED loads specified at 120 volts or 277 volts.
2. Relays shall be capable of withstanding repetitive inrush current of 30 times operating current without impacting its lifetime.

B. Dimmers

1. Dimmers shall be electronic analog 0-10 volt DC output type, fully rated at 20 amps output continuous duty for LED loads specified at 120 volts or 277 volts.

C. Networked Devices

1. Devices shall be powered with Class 2 low voltage supplied locally via a directly wired power supply or delivered via a low voltage networked cabled connection. Wiring shall be CAT-5, UTP, or other network wiring as required by manufacturer.
2. Include all communications hubs, gateways, controllers, splitters as may be required to support control devices required to serve the entire system.
3. Devices located above ceilings shall be plenum rated.

2.3 RELAY PANELS

A. Provide Relay Panels with quantity of zone relays as scheduled on the Drawings. Relay Panels shall also include dimmers for zones as scheduled on the Drawings.

B. Performance requirements and operational characteristics shall be as specified above. Relays shall be latching type.

C. Provide input power from 120 or 277 volt unswitched lighting branch circuit or as shown on the Drawings.

D. Where required, provide a barrier to segregate normal and emergency zone controls and wiring compartments.

2.4 LOW-VOLTAGE CONTROL DEVICES

A. Astronomical Time Clock (ATC)

1. ATC shall automatically control switching and contact closure outputs for relay control. Location shall be at head end of system, within relay panel or as shown on the Drawings.
2. Unit shall be capable of accommodating up to 500 Owner defined events, 7 daily schedules and 40 holiday schedules.

    a. ATC events shall be triggered by time of day or by an offset from sunrise or sunset.
    b. ATC shall automatically adjust for leap year and daylight savings time.

B. Pushbutton Wall Stations:

1. Pushbuttons shall be momentary soft-click style with quantity of pushbuttons as indicated on the Drawings or as specified herein.
2. Engrave pushbuttons with appropriate zone description or as specified on the Drawings. For generic control, refer to engraving specified below for Pushbutton Wall Station Types. Coordinate zone control descriptions with Owner and Architect and provide the information to Manufacturer prior to fabrication.
3. Pushbutton Wall Station Types:

    a. Type L: Two-button unit for use in manually controlling a ZC relay (or multiple ZC relays). Also use as a manual override of automatic controls. Unless otherwise indicated on the Drawings, engraving shall be "ON" and "OFF".
    b. Type LD: Three-button unit for use in manually controlling a ZC relay and dimmer (or multiple ZC relays and dimmers). Unless otherwise indicated on the Drawings, engraving shall be "ON/OFF", "RAISE" and "LOWER".
    c. Type LD1: Six-button unit for use in manually controlling two ZC relays and dimmers. Engraving shall be "ON/OFF", "RAISE" and "LOWER" for one zone and "ON/OFF" for the second zone.
    d. Type LD2: Six-button unit for use in manually controlling two ZC relays and dimmers. Engraving shall be "ON/OFF", "RAISE" and "LOWER" for two sets of pushbuttons.

4. Pushbutton Wall Stations shall be connected to the system network via low voltage network wiring as required by Manufacturer.
5. Pushbutton Wall Stations shall be flush mounted in a two-gang outlet box with single-gang plaster ring.
6. Pushbutton Wall Stations shall match color of wiring devices specified in Electrical Basic Materials and Methods.

C. Vacancy Sensors:

1. Vacancy Sensors and Occupancy Sensors shall be considered interchangeable terms for the same equipment with system programming necessary to meet the operational requirements.

    a. Sensors shall sense the presence of human activity within the desired space to fully control the on/off function a ZC relay without the use of a manual pushbutton.
    b. Sensors shall be manual on, unless otherwise noted on the Drawings or within these Specifications. Contractor shall coordinate all time delays with Owner.
    c. Sensors shall be instant (automatic) on, in all public corridors and stairwells, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety and security of the room or building occupant(s).

2. Sensor Technology:

    a. Unless otherwise noted, sensors shall utilize passive infrared (PIR) technology which detects occupant motion to allow manually enabled ZC relay to close (turn lights on) and stay closed.
    b. For applications where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions), a sensor with an additional technology type shall be used. Acceptable dual technology includes PIR/Microphonic or PIR/Ultrasonic.
    c. Sensor shall include programmable time delay up to 30 minutes.

3. Vacancy Sensor Types:

    a. Type DC: Ceiling mounted dual technology sensor with nine-level PIR detection pattern minimum. Coverage shall be 360 degrees horizontal for 1,000 square foot minimum area.

4. Sensors shall be available in multiple lens options which are customized for specific applications.
5. Sensor unit shall include one integrated relay with relay contact rated for 1 amp at 24 volts.
6. Sensors shall be connected to the system network via low voltage network wiring as required by Manufacturer.

    a. Sensors shall have the ability to detect when it is not receiving valid communication and blink its LED in a pattern to visually indicate of a potential wiring issue.
    b. Every sensor parameter shall be available and configurable remotely from the software and locally via the device push-button.

7. Wall switch sensors shall be flush mounted in a two-gang outlet box with single-gang plaster ring. Wall switch sensors shall match color of wiring devices specified elsewhere.
8. Sensors shall be ceiling mounted or wall mounted and shall be flush or semi-flush.
9. Wall switch sensors shall be available with optional raise/lower dimming adjustment controls for single-room/single-zone control.

2.5 LIGHTING CONTROL MANAGEMENT SYSTEM SOFTWARE

A. Provide Software for programming of Networked Lighting Control System. The system navigation and status reporting shall be performed using electronic floor plans of the building.

1. Software shall be Windows based, capable of running on either central server or a remote client over TCP/IP connection. Unless otherwise noted, software shall be loaded onto a PC provided by the Owner.
2. Software shall allow users to define and configure the following:

a. Geographical Layout and Equipment Integration
b. Load Control Schedule
c. Daylighting Illumination Level Control
d. Lighting Scenes
e. Control Station Programming
f. Occupancy Scheduling

3. Software shall provide the following System information and control:

a. Zone Monitor and Control for on/off status or illumination level.
b. Daylighting enable/disable.
c. Power Usage and Load Shedding allowing load shed reduction to selected areas.
d. Diagnostics to check on the status of all equipment.

B. Networked Lighting Control System shall have the ability to communicate to Building Automation System (BAS) by means of BACnet IP communication from a common building network.

1. The following System information and control shall be integrated into the BAS:

a. Zone Monitor and Control for on/off status and on/off after-hours control.
b. Zone or Area vacancy status.
c. System Fault.
d. Power Usage and Load Shedding allowing load shed reduction to selected areas.

2.6 SYSTEM ACCESSORIES

A. Provide a Gateway controller located at head end of system, within relay panel or as shown on the Drawings. Controller shall accommodate BACnet IP communication for Building Automation System (BAS).

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordination

1. The Contractor is responsible for scheduling of and participating in all testing as required for Commissioning of Lighting Control System.
2. Coordinate with the Owner all requirements specified herein, including:

a. Pushbutton engraving descriptions.
b. Programming of time-based system scheduling.
c. Hardware and Network requirements for loading of System Software.

3. Coordinate with the Luminaire Manufacturer to ensure dimming controls are compatible with LED dimming drivers.
4. Coordinate with BAS Contractor as required to integrate System information and controls into the BAS.
5. Coordinate with BAS Contractor and Technology Contractor for cable jacket color.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Ensure that conduit for line voltage wiring enters panels or components in line voltage areas and conduit for low voltage control wiring enters in low voltage areas. Check Manufacturer's Drawings for location of line and low voltage areas.

B. Exterior photosensors shall be mounted on the building roof facing a northerly direction.

C. Relay Panels shall be mounted so that top of the enclosure is at 72 inches above the finished floor. Panels shall be mounted adjacent to the panelboard where lighting branch circuits originate.

3.3 LABELING

A. Labels for panels, devices, and remote indicators shall be laminated phenolic with a black surface and white core. Label shall include an adhesive suitable for permanent mounting.

B. Cabinet and panel doors shall be marked with the identification numbers and location of the circuit breaker supplying power to the panel.

C. Switches and buttons

1. Each switch and button shall be identified by a label descriptor that is unique.
2. Labels for spare switches and buttons shall be provided and shall remain blank until used.

D. Field Devices

1. All devices shall be professionally labeled with a device address label which is readily viewable.

3.4 WIRING

A. The Contractor shall provide outlet boxes, conduit, sleeves and miscellaneous fittings and materials for System rough-in.

1. Low voltage wiring in walls and in ceilings that are not accessible shall be in conduit. Conduit from each outlet box shall stub-out to above the nearest accessible ceiling space.
2. Provide an insulated bushing at each conduit stub.
3. The minimum conduit size shall be ¾-inch with fill capacities in accordance with the NEC.

4. Conduit runs shall not contain more than two 90-degree bends prior to termination unless conduit size is increased to the next trade size of that shown on the Drawings. Conduit shall not exceed three 90-degree bends regardless of size.
5. Mounting heights shall be as indicated on the Drawings.
6. Cable tray utilized by Technology IT cables shall not be used for lighting system cables.

B. Wiring types and sizes shall be approved by the equipment Manufacturer. Ensure that minimum wire gauge, insulation, capacitance, and all other performance measures required by Manufacturer are met.

1. Low voltage wiring shall be plenum rated and supported above accessible ceilings with J-hooks and shall be kept separate from other system wiring.
2. Low voltage wiring outer sheath shall be a different color that the wiring utilized by the BAS Contractor or the Technology Contractor.
3. Adhere to Manufacturer's recommendations as to maximum wire length.

3.5 START-UP AND ACCEPTANCE TESTING

A. The Manufacturer shall provide factory trained representatives to program the system. The representatives shall verify that the Contractor has properly installed and interconnected all supplied components. The representatives shall start up all equipment and demonstrate that it meets the requirements of this Specification.

1. Programming for scene control and timed control shall be coordinated with the Owner, Architect and Engineer. The Owner shall set the parameters for the timing on and off the systems.

B. Preliminary Testing:

1. Conduct preliminary tests (Pre-Test) to ensure that luminaires and devices are functioning properly.
2. Contractor shall correct any deficiencies discovered.
3. Contractor Pre-Test and correction of deficiencies shall be completed at least 14 days prior to any required testing by the Commissioning Agent.

C. Acceptance Test:

1. Upon completion of the installation, and after satisfactory testing of the System by the Contractor in the presence of the Supplier, the Contractor shall test the System in the presence of the Commissioning Agent and Engineer (if available).
2. Contractor shall have all Manufacturers' recommended test equipment readily available for the Test.
3. During acceptance test, Contractor shall demonstrate all equipment and System features. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the Engineer.

END OF SECTION

SECTION 267200 - TECHNOLOGY SYSTEMS ROUGH-IN

PART 1 - GENERAL

1.1 TECHNOLOGY COORDINATION

A. The Contractor shall refer to the Technology Drawings and Specifications for additional information and system descriptions related to Technology Grounding system and device rough-in requirements required to be provided by the Electrical Contractor. If discrepancies are encountered with this Section, the Technology Contract Documents shall be followed.

1.2 SUBMITTALS

A. Refer to Sections 26 01 00 and 26 01 01 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Electrical General Provisions

B. Electrical Basic Materials and Methods

C. Electrical Firestopping

D. All Technology Specification Sections

1.4 TELECOMMUNICATIONS SERVICE

A. The Telecommunications Service to the existing building shall remain.

PART 2 - PRODUCTS

2.1 TECHNOLOGY CONDUITS AND BOXES

A. The Contractor shall furnish and install Technology outlet boxes, conduit, sleeves and miscellaneous fittings and materials for each of the following low voltage technology systems:

1. Voice and Data Conduits and Boxes
2. Audio/Video System Conduits and Boxes
3. Security System Conduits and Boxes

B. Outlet boxes shall be 4 inches square, minimum, unless otherwise indicated in the Technology Contract Documents, with appropriately sized plaster rings. Blank coverplates shall be provided for all unused outlet boxes.

C. Mounting heights shall be as indicated on the Drawings.

PART 3 - EXECUTION

3.1 TECHNOLOGY CONDUITS AND BOXES

A. All conduits and boxes required for technology system rough-in as shown on the Drawings shall be installed complete with pullwires. Conduits shall be 1-¼ inch minimum, or as sized in the Technology Contract Documents.

B. Provide conduit from each outlet box up to the nearest accessible corridor or open area ceiling space.

C. Mounting heights shall be as indicated on the Drawings.

D. Provide an insulated bushing at each conduit stub.

E. All Work shall be installed in accordance with the requirements of EIA/TIA-569, BICSI's Telecommunications Distribution Methods Manual (TDMM), and as indicated on the Drawings.

F. Conduit runs shall not contain more than two 90-degree bends prior to termination unless conduit size is increased to the next trade size of that shown on the Drawings. Conduit shall not exceed three 90-degree bends regardless of size.

G. Conduit runs shall not exceed 100 feet without utilizing a pullbox sized per Table 4.14 of the TDMM.

H. All conduits shall be reamed smooth to prevent accidental damage to the cables, and have a non-metallic bushing installed.

I. All conduits stubbed into an open area (concealed ceiling space) shall extend 1-inch to 3 inches from the finished surface.

J. The Contractor shall coordinate the type and arrangement of receptacles and outlets indicated on the Technology Drawings with the Technology system supplier prior to the installation of any Electrical Work. The Contractor shall notify the Engineer if discrepancies are found. Any Work installed that must later be relocated as a result of the Contractor's negligence in coordinating with the Technology system supplier shall be done as directed by the Engineer at no additional cost.

END OF SECTION

SECTION 268140 - ADDRESSABLE FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Connection of New Fire Alarm System Devices and/or Functions to an Existing System

1.2 DESCRIPTION OF WORK

A. General Scope

1. Provide new initiating and notification appliances and all required cabling, components and programming required for a complete operational system.

2. This work includes providing a fire alarm system as described herein and on the Contract Drawings. Include in the system; wiring, raceways, pull boxes, outlet and mounting boxes, control equipment, alarm, and supervisory signal initiating devices, alarm notification appliances, supervising station fire alarm system transmitter, and other accessories and miscellaneous items required for a complete operating system even though each item is not specifically mentioned or described. Provide system complete and ready for operation.
3. Provide equipment, materials, installation, workmanship, inspection, and testing in strict accordance with the required and advisory provisions of the listed codes and standards except as modified herein.
4. System shall meet the Building Code, adopted codes and FM requirements for this Occupancy.

B. General information

1. The Riser Diagram shows the intent of these Specifications and shall be used as a Basis of Design. The conduit sizing, types, and number of wires shall be verified with the Manufacturer prior to submitting a bid and prior to installation in the building.
2. Adjust system components to meet the intent of the Contract Documents while accommodating Manufacturer specific capabilities or limitations. Notify the Engineer and note any deviations on the shop drawings.

1.3 QUALITY ASSURANCE

A. General

1. The features and capacities described in this Specification are required as a minimum.
2. Terms in this Specification are intended to match the terms in NFPA 72. The definitions section in Chapter 3 of NFPA 72 shall be considered as part of this Specification.
3. The Contract Documents are not intended to conflict with NFPA 72, the State adopted Building Code, or any other legal requirement. The Contractor shall provide immediate notification of any perceived conflicts prior to bidding.

B. Listings

1. The Fire Alarm System shall be UL Listed in accordance with the 9th edition NFPA 72 referenced edition of UL864. All control equipment shall be Listed under UL category UOJZ as a single control unit.
2. The System controls shall be UL Listed for Power Limited Applications.
3. Fire Alarm devices and equipment shall be compatible with the fire alarm system and listed by UL in the Fire Protection Directory.
4. Carbon monoxide detectors shall be listed to UL 2075 - Standard for Gas and Vapor Detectors and Sensors.

C. Contractor and Distributor Qualifications

1. The Contractor shall have successfully installed systems of similar scope and size. The Contractor shall submit 5 references for similar projects completed in the past 5 years.
2. The Contractor shall Contract with a single Distributor for fire alarm equipment, design, programming, inspection and tests. The Supplier shall be an approved representative of the System Manufacturer.
3. The Distributor shall directly employ a minimum of one Competent Technicians. For the purpose of this Specification the term Competent Technician shall be defined as:

    a. A person who is NICET Level 3 Certified in Fire Alarm Systems.
    b. A person who has been trained and certified by the Manufacturer for installing, repairing, and testing all components of the System. The Distributor shall provide proof of having completed factory training and certification for the equipment being installed on the project.

4. The Distributor shall submit verification of having provided at least 10 systems of the Manufacturer being submitted for the project with the regional area of the project (circa 125 miles).

D. Acceptable Manufacturers shall be:

1. TYCO/Digital Security Controls.

1.4 SUBMITTALS

A. General Requirements

1. Submittals shall be signed by a Professional Engineer or Fire Alarm System Designer employed by the Fire Alarm System Supplier. Designer shall be certified by NICET as a Senior Engineering Technician (Level 3) for Fire Alarm Systems.
2. Review and supplement Contract Documents as required to meet Code and specifics of System submitted. Shop drawings shall demonstrate a fully code compliant system.
3. Submittals shall include all requirements of:

    a. The State adopted Building Code
    b. The State adopted Fire Code
    c. Any additional information required by the AHJ
    d. Requirements of the Electrical General Provisions Specification
    e. Additional items listed below
    f. Any other submittals required by the Contract Documents.

B. Construction Submittals

1. Include the following information in addition to other submittal requirements:

a. Product Data: Include supervisory power usage, alarm power usage, physical dimensions, and finish and mounting requirements.

b. Shop Drawings:

1) Provide all information as required by IBC 907.1.2. Ensure ceiling heights are included for heat detector mounting locations or any other device that is dependent upon mounting height.

2) Provide narratives and drawings as required to detail how survivability requirements of NFPA 72 will be met.

3) Installation drawings, shop drawings, and as-built drawings shall be prepared by an individual experienced with the work specified herein.

4) Provide a riser diagram depicting the panels in the system, major components and wiring requirements.

c. Floor Plans

1) Drawings shall be to scale. Submit 24x36 or 30x42 inch shop drawings at a scale not smaller than 1/8 inch = 1 foot. System component data and calculations shall not be smaller than 8.5x11 inch size.

2) Include locations of all fire alarm control equipment, power supplies, and field devices.

3) All equipment shall be identified with a designation number or code which correlates the equipment shown on the floor plan with the label affixed to the installed panel or device.

4) Field Devices. Identify on the floor plan any information required to positively identify field devices including:

a) The node number, loop number, SLC address for all addressable devices and modules.

b) The panel and NAC circuit designation for all Notification Devices.

c) Candela rating (or setting) for Visible Notification Appliances.

d) Wattage setting for speakers.

e) Equipment requiring power shall be shown as associated with a particular power supply.

5) Show location and identification of panel boards that will be powering fire alarm system load. Indicate branch circuit numbers utilized by fire alarm equipment.

6) Include designation / location of each Acoustically Distinguishable Space (ADS) type.

2. Calculations

a. Provide complete battery calculations per NFPA 72.

b. Power Supplies. List each power supply individually and include the Manufacturer's recommended load and configuration. Power supplies shall be sized to provide a 20% spare capacity.

c. NAC (Notification Appliance Circuit) Calculations. NAC Circuit design shall be based upon all devices on a circuit being operated at their design level plus 20% spare capacity at the end of the circuit.

3. Interfaces

a. Provide details of the interface to any other system including but not limited to the following: Fire protection equipment interfaces, special suppression system interfaces, and HVAC or BAS interfaces.

1.5 GUARANTEE AND WARRANTIES / SERVICE CONTRACT

A. The Contractor shall guarantee all equipment and wiring to be free of mechanical and electrical defects for a period of one year from the date of acceptance by the Owner.

PART 2 - PRODUCTS

2.1 PERIPHERAL DEVICES - GENERAL

A. Addressable Devices

1. Addressable devices shall include the capability of being disabled or enabled individually.
2. For Systems that require a programming device to set the address code the Supplier shall provide a programming tool and training for the Owner.

2.2 INITIATING DEVICES

A. Bases and Heads

1. Addressable smoke and heat detector heads shall be pluggable into associated bases. The device shall communicate the detector status to the Control Panel over two wires. The same two wires shall also provide power to the base and detector. Different detector heads (smoke or heat) shall be interchangeable. Upon removal of the head, a trouble signal shall be transmitted to the Control Panel.
2. Each device shall be scanned by the Control Panel for its type identification to prevent inadvertent substitution of another detector type. The Control Panel shall operate with the installed device but shall initiate a trouble condition until the proper type is installed or the programmed device type is changed.
3. Each base shall contain an LED that shall provide a distinct visual representation of the status of the device. LED shall minimally indicate alarm, trouble, and normal condition of device.

B. Smoke Detectors (Addressable)

1. Smoke detectors shall be of the multi-criteria type and shall communicate actual smoke chamber values to the Control Panel.
2. Smoke detectors shall be capable of performing alarm verification in accordance with NFPA 72. Verification shall not be initially enabled.

3. Smoke detectors shall be capable of reporting a "dirty" condition to signal that cleaning or maintenance is required.
4. The detector shall report a trouble condition if it's sensitivity is outside of its Listed range.
5. Detectors shall be Listed for both ceiling and wall mount applications.
6. Detectors shall be installed only as approved by the Manufacturer in accordance with the UL Listing.
7. Minimum Listed spacing for detectors shall be 30 feet or greater.

C. Carbon Monoxide Detectors (Addressable):

1. Carbon monoxide detectors shall have an electrochemical sensing cell and shall communicate to the FACU. Alarm thresholds and sensitivity limits shall be Listed to UL-2075 and 2034.
2. Carbon monoxide detectors shall be provided with a sounder base capable of providing a T4 temporal pattern when carbon monoxide (CO) is detected.
3. CO detectors may be provided that offer other functions such as smoke detection and/or heat detection as indicated on the Drawings. Functions not specifically indicated on the Drawings shall not be programmed into the Fire Alarm signaling system. Sounder base operation for non-CO sensor detection shall not be used.
4. CO detector shall be provided with detector testing capability.
5. CO detector shall be provided with detector cell end-of-life warning signal.

2.3 NOTIFICATION APPLIANCES

A. General

1. Notification appliances shall be Listed for use with power supplies and/or fire alarm systems.
2. The Notification Appliance shall be a white.
3. Notification Appliances shall be listed and approved for the orientation that it is installed, wall or ceiling.

B. Visible Notification Appliances

1. Visible Notification Appliances shall be Listed for mounting in either vertical or horizontal positions. Devices, unless noted otherwise, shall be a multi-candela strobe with intensity selectable from a minimum range of 15- 95 cd. The devices shall be UL Listed to Standard 1971. The device output shall be set in accordance with NFPA 72.
2. All visible devices shall flash in a synchronized pattern. To ensure synchronization, Visible Notification Appliances located in a common field of view shall either be synchronized between panels or shall be activated from a common panel.

C. Audible Notification Appliances

1. Indoor Horns

a. Horns shall have a minimum rating of 90 dBA at 10 feet as determined by the reverberant room test
b. Provide fire alarm horns conforming to UL 464.
c. Audible appliances throughout shall emit a synchronized, temporal signal.

D. Combination Audible / Visible Notification Appliances:

1. Shall be designed and Listed as a single unit.
2. Each portion shall meet the requirements for an individual device of that type.

PART 3 - EXECUTION

3.1 COORDINATION

A. General

1. The Contractor shall coordinate with other parties as required to fulfill the requirements of the Contract Documents.
2. The Contractor is responsible for scheduling of and participating in all testing of interfaced equipment supplied by others.
3. The Contractor shall make all connections to interfaced equipment.
4. Items listed as coordination requirements are listed for clarification and are not intended to indicate the entire extent of coordination required.

B. Specific Requirements

1. Coordinate with the Owner to obtain the Fire Safety and Evacuation Plan as identified in State adopted Fire Code and coordinate to develop the call list for Supervising Service Contract.
2. Coordinate with the Door Hardware Contractor for control of electrical door locks and releasing as required.
3. Coordinate with the Fire Protection Systems Contractor for connection, adjustment, and testing of suppression equipment.
4. Coordinate with the Mechanical Contractor for connection to mechanical controls and components and for determining final location of Duct Smoke Detectors and dampers.
5. Coordinate with the Elevator Contractor for connection and testing of fire alarm devices associated with the elevator.

C. existing systemsFor extension of existing Systems include all hardware, devices, and upgrades as recommended by the Manufacturer to meet requirements of Contract Documents.

D. Interruption of existing Fire Alarm System shall be minimized and coordinated with Owner.

E. Contractor is responsible for any required Fire Watch during System interruptions.

3.2 INSTALLATION OF FIRE ALARM INITIATING AND NOTIFICATION EQUIPMENT

A. All initiation and notification equipment shall be installed on back boxes/junction boxes. Field verify exact locations of all panels. All ceiling mounted devices in lay in ceiling areas shall utilize T-Bar hangers or approved equal. Provide a typed label on each manual pull station, detector, and interface module to indicate the loop and address number of the device.

B. Spot Type Smoke and Heat Detectors:

1. Adjust spacing of smoke detectors, within the limits of Code, to comply with the following general requirements:

    a. Smoke alarms and smoke detectors shall not be located where ambient conditions, including humidity and temperature, are outside the limits specified by the Manufacturer's published instructions.
    b. Smoke alarms and smoke detectors shall not be located within unfinished attics or garages or in other spaces where temperatures can fall below 40ºF (4ºC) or exceed 100ºF (38ºC).
    c. Where the mounting surface could become considerably warmer or cooler than the room, such as a poorly insulated ceiling below an unfinished attic or an exterior wall, smoke alarms and smoke detectors shall be mounted on an inside wall.
    d. Smoke detectors shall not be installed within a 20 ft horizontal path of a cooking appliance exhaust. If space constraints conflict with this requirement, the detector shall be mounted as far away from cooking appliance as possible, within Listed spacing of device.
    e. Smoke alarms and smoke detectors shall not be installed within a 36 in. horizontal path from a door to a bathroom containing a shower or tub or any other source of steam.
    f. Smoke alarms and smoke detectors shall not be installed within a 36 in. horizontal path from the supply registers of a forced air heating or cooling system and shall be installed outside of the direct airflow from those registers.
    g. Smoke alarms and smoke detectors shall not be installed within a 36 in. horizontal path from the tip of the blade of a ceiling-suspended (paddle) fan.

3.3 LABELING

A. General

1. Labels for panels, devices, and remote indicators shall be laminated phenolic with a black surface and white core. Label shall include an adhesive suitable for permanent mounting.

B. Panels

1. Cabinet and panel doors shall be marked with the identification numbers and location of the circuit breaker supplying power to the panel.

C. Switches and buttons

1. Each switch and button shall be identified by a label descriptor that is unique.
2. Labels for spare switches and buttons shall be provided and shall remain blank until used.

D. Field Devices

1. All devices shall be professionally labeled with a device address label, readily viewable from the floor level, without having to disassemble the device.

    a. Where smoke and heat detector heads are similar in appearance indicate the device type on the address label.

2. Remote alarm indicators shall be labeled to indicate device type, address, and location of the device.
3. Monitor Modules shall be labeled to indicate device type monitored, address, and location of the device.
4. Control Relays shall be labeled to indicate device type controlled, address, and location of the device.

3.4 WIRING

A. Raceway General

1. Boxes shall be painted red.

B. All wiring shall be in conduit.

1. The minimum conduit size shall be 3/4" with fill capacities in accordance with the NEC. Exception - Drops that serve a single peripheral device may be 1/2" from the junction box to the device.
2. Raceway and boxes lower than 6 feet AFF serving sprinkler system devices and fire pumps shall be Liquid Tight.
3. Wiring types and sizes shall be approved by the equipment Manufacturer. Ensure that minimum wire gauge, insulation, capacitance, and all other performance measures required by Manufacturer are met.
4. The use of Type MC fire alarm cable is permitted in lieu of conduit to the extent permitted by the NEC, except that conductors shall be in conduit or surface raceway as applicable in public or occupied areas with exposed ceilings. A Type MC fire alarm cable shall be red striped or otherwise identified. Type MC cable shall be similar to AFC Cable Systems Fire Alarm/Control Cable (product indicated to show level of quality and styling). Install, support, and terminate as required by the NEC and the Manufacturer's instructions.
5. The building may use exposed surface raceways when it is necessary to route exposed cabling in public accessible or finished areas. The extent to which surface raceway is permitted is based on the feasibility of first routing concealed conduit or fishing Type MC fire alarm cable to the device. Where this is not practical, surface raceway is permitted with the approval of the Owner. For any exposed surface raceways, metallic or non-metallic surface raceway is permissible. Non-metallic surface raceway shall be similar to Panduit LDP models (product indicated to show level of quality). All surface raceway shall be sized as required.

3.5 ACCEPTANCE TESTING

A. Preliminary Testing

1. Conduct preliminary tests (Pre-Test) to ensure that devices and circuits are functioning properly. Tests shall meet the requirements of the Manufacturer and NFPA 72 for Initial and Acceptance testing.
2. Contractor shall correct any deficiencies discovered.
3. Contractor Pre-Test and correction of deficiencies shall be completed at least 14 days prior to any required testing by the AHJ.

B. Request for Acceptance Test

1. After Pre-Test and corrections are complete, the Contractor shall submit a formal Request for Acceptance Test.
2. The Contractor shall send a written request, on company letterhead, for the Final Acceptance Test. The request shall include a statement that the System installation is complete, fully operable, and is in compliance with the Contract Documents.
3. Include a detailed Pre-Test report that lists all tests performed. Report shall include test results including the following details:

    a. Each device listed separately with label (as programmed) and address.
    b. Each required function listed separately.
    c. Sensitivity readings for all smoke detectors.
    d. Location of each Acoustically Distinguishable Space (ADS).
    e. Primary and Secondary power supply test results.
    f. Details of any test procedures required or recommended by the Manufacturer, that exceed, alter, or clarify the requirements of NFPA 72. Where no additional requirements exist this shall be listed and submitted.

4. Provide a full size copy of the redlined record drawings for verification of the fire alarm installation during the Acceptance Test.
5. Provide a complete program printout including addresses for all inputs / outputs.

C. Acceptance Test

1. Upon completion of the installation, and after satisfactory testing of the System by the Contractor in the presence of the Supplier, the Contractor shall test the System in the presence of the Engineer, Owner and/or Owner's Representative, and the AHJ.
2. Provide a copy of the Pre-Test report at the beginning of the test.
3. Contractor shall have all Manufacturers' recommended test equipment readily available for the Test.
4. During acceptance test, Contractor shall demonstrate all equipment and System features. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the Engineer.
5. At the discretion of the Owner or AHJ, the acceptance test may be stopped when problems occur that indicate the System was not pre-tested properly by the Contractor. The Contractor is responsible for all fees for additional tests if System is found to be incomplete or not pre-tested as indicated.
6. The Engineer may require additional tests beyond those required by the Fire Marshal or AHJ to ensure that the System meets the requirements of the Contract Documents. These tests may be conducted prior to, during, or after the inspection by the Fire Marshal or AHJ.

    a. Any portions of the work observed and found to be deficient or not in compliance with the Drawings and Specifications shall be rejected. The Engineer shall prepare a list of any such deficiencies observed during the acceptance test. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to the Engineer to retest/re-inspect deficiencies.

END OF SECTION

SECTION 270100 - TECHNOLOGY GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to this Division's Supplemental General Provisions for additional Project requirements.

B. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates and Addenda are a part of this Specification. Contractors and Subcontractors shall examine these provisions as they may affect work under this Division.

C. Contractor shall examine Division 1 Contract Documents for general project requirements.

D. Contractor shall also examine the Contract Documents of all Divisions which may affect and require work under this Division and be responsible for all work required under this Division.

1.2 DESCRIPTION OF WORK

A. This project involves work in an existing operating facility and will require close communication with Owner with regard to access and work hours. Coordinate all work schedules prior to bidding with Owner. When project includes a Construction Manager, all work schedules shall also be coordinated with the Construction Manager, prior to bidding.

B. All Drawings as well as the Specifications for all Divisions shall be defined as the Contract Documents. Contractor shall review entire set of Contract Documents prior to bidding.

C. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both the Specifications and the Drawings.

D. Prior to submitting bid, Contractor shall examine all Drawings and Specifications to develop a complete understanding of the project scope. Contractor shall ask for clarifications during the pre-bid phase of the project. Failure to do so will not relieve the Contractor of their responsibility to perform all required work.

E. Where the project scope involves renovations and additions, it is required that Contractors visit the site of the work and become familiar with the conditions affecting the installation. Submission of a Bid shall presuppose knowledge of such conditions and no additional compensation shall be allowed where extra labor or materials are required because of the lack of knowledge of these conditions.

F. Bid shall include any special phasing requirements related to the construction work as described in the Contract Documents. Coordinate with Division 1.

G. Extra costs which might result from deviations from the Drawings, so as to avoid interferences, shall be considered a "Job Condition", and no additional compensation shall be considered applicable. In the event that such interferences occur in course of the work, due to an error, omission, or oversight by the Contractor, no additional compensation shall be allowed. Interferences that may occur during the course of construction shall be brought to the immediate attention of the Architect and Engineer, and the Architect and Engineer's decision, confirmed in writing, shall be final.

H. The following general terms as used within the context of the Contract Documents shall be defined as follows:

1. "Contract Documents" - The complete set of Drawings and Specifications for all Divisions included in the project.
2. "Drawings" - Drawings furnished as part of the Contract Documents.
3. "Contractor" - This Division's Contractor and the Subcontractors to this Division's Contractor.
4. "Responsible" - To perform work required.
5. "Furnish" - To supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
6. "Install" - Work which includes the actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
7. "Provide" - To furnish and install, complete and ready for the intended use.
8. "Equal" - To meet or exceed the standards of the specified products or listed manufacturers.
9. "Mechanical" - HVAC, Plumbing and Fire Protection Divisions as applicable.

1.3 WORK INCLUDES

A. Include all labor, material, equipment, services, coordination, supervision and administration necessary for the proper completion of all work shown. Items omitted, but necessary, to make all systems complete and workable shall be understood to form part of the work.

B. Material for work required to complete installation such as earthwork, concrete, masonry, mortar, reinforcing steel, patching and painting shall be provided as specified in other applicable Divisions covering such work.

C. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work and which is customarily a part of work of similar character.

D. Include all testing, test reports, system programming, start-up reports and warranties for each system as outlined elsewhere in these Specifications. Refer to "Operating and Maintenance Manuals" for additional requirements.

1.4 ALTERNATES

A. Refer to this Division's Supplemental General Provisions for a description of alternates.

1.5 PERMITS AND FEES

A. Secure and pay for permits and inspections required for all work related to this Division. Turn over certificates of approval to the Owner or Construction Manager promptly when received, and before payment is made for the work.

B. Give proper authorities notice as required by law relative to the work in their charge. Comply with the regulations regarding temporary enclosures, obstructions or excavations and pay all legal fees involved.

1.6 QUALITY ASSURANCE

A. Work shall be installed in accordance with provisions of all applicable codes, as interpreted by the local Authority Having Jurisdiction (AHJ), as well as any further modifications or regulations published by local or State Authorities.

B. Reference to the codes and standards listed shall constitute the minimum acceptable requirements. Nothing in the Specifications shall be construed to permit deviation from the requirements of the governing code. Where requirements of the Drawings and Specifications exceed those of the code listed, follow the Drawings and Specifications.

C. The following building codes with amendments shall be followed:

1. Ohio Building Code
2. Ohio Fire Code

D. Applicable portions of the following codes, standards, societies and agencies shall be followed. Where a specific edition is listed, it shall be used. Where not listed, the edition recognized by the Authority Having Jurisdiction shall be used. Listing of a specific portion of a code, standard, society or agency does not preclude the Contractor from following all other applicable portions of the code, standard, society or agency.

1. American National Standards Institute (ANSI)
2. American Society of Testing and Material (ASTM)
3. Americans with Disabilities Act (ADA) - Americans with Disabilities Act Accessibility Guidelines (ADAAG)
4. Federal Occupational Safety and Health Act (OSHA)
5. NFPA Standards as referenced by the Building Codes.
6. Authority having jurisdiction

1.7 ELECTRONIC MEDIA

A. Electronic drawing files are available to the Contractor from the Engineer for coordination purposes as defined in Division 0 and Division 1.

B. Contractor shall deliver closeout documents on a portable memory device. Portable memory device shall refer to CD, DVD, Flash Drive, external hard drive or any other portable media used for storing electronic files.

1.8 SUBMITTALS

A. Conform to submittal requirements outlined in Division 1 Specifications. Provide Submittals in an electronic format. The file format shall be portable data file (.pdf).

B. Submittal transmittal shall list corresponding Specification Section and a description of item(s) being submitted. Each submittal shall only include items from one Specification Section. Submittals which include items from multiple specification sections will be returned "REVISE AND RESUBMIT."

C. Prepare Submittals with adequate details and dimensions as necessary to clearly show construction. Clearly identify each item on the submittal with designation as indicated on Drawings including location and use. Include with Submittals Manufacturers published descriptive literature, specifications, performance data (normal operating characteristics, curves, ratings, etc.), wiring diagrams and installation instructions. Indicate for each item the operating characteristics, design conditions, features, and optional items that are intended for application on this project. Where contents of Submittal literature include data not pertinent to the Submittal, clearly indicate (highlight) which portion of content is being submitted for review.

D. Contract Documents include scheduled equipment which is the Basis of Design and used to establish design and space requirements. Contract Documents may also include alternative acceptable manufacturers. Where alternative manufacturer's equipment is submitted which alters the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with deviations from the Basis of Design shall be borne by the Owner.

E. If for any reason, the Submittal shows variations from the requirements of the Contract Documents, the Contractor shall make mention of such variation in the letter of transmittal. The Contractor shall note in red on the Submittal any change in design or dimension on the items submitted including changes made by the Manufacturer which may differ from catalog information.

F. Where additional installation drawings, wiring diagrams or other drawings are specified elsewhere as part of the project requirements, they shall be submitted at the same time as the Submittals. Partial Submittals are not acceptable.

G. Contractor shall review each Submittal prior to submission, and check for compliance with the Contract Documents. Corrections shall be noted. Mark with approval stamp prior to submission. Submittals that do not bear the Contractor's approval stamp will be returned without action.

H. The Submittals will be reviewed only for General compliance and not for dimensions, quantities, etc. The responsibility of correct procurement remains solely with the Contractor. The Submittal review shall not relieve the Contractor of responsibility for errors or omissions and deviations from the Contract Document requirements. Submittals which are not required under this Division shall be returned to the Contractor.

I. Where Submittal review format, whether hard copy or software based, includes pre-determined language that includes the word "Approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" or similar verbiage shall be defined as "Reviewed, Exceptions as Noted".

J. After review of submittals by the Engineer, the Contractor shall revise and resubmit if required to establish compliance with the Contract Document requirements. Resubmittal shall include a document with a written response to each of the Engineer's previous comments.

K. The Contractor shall notify the Engineer when all product data and/or shop drawings for all equipment, materials and systems have been submitted for review.

L. The Contractor agrees that Submittals, processed by the Engineer, are not change orders; that the purpose of submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design intent of the project. This understanding is demonstrated by indicating which equipment and material is required, and by what methods of fabrication and installation will be utilized.

M. The Contractor further agrees that if deviations, discrepancies or conflicts between the Submittals and the Contract Documents are discovered, either prior to or after Submittals are processed by the Engineer, the Drawings and Specifications shall control and shall be followed.

N. Final reviewed submittals shall be included in the Operating and Maintenance Manuals. Where Submittals are returned "REVIEWED, EXCEPTIONS AS NOTED", the final Submittals shall be updated to include the exceptions. Upon ordering equipment, order sufficient number of sets of product data literature for the Operating and Maintenance Manuals.

1.9 GUARANTEE AND WARRANTIES

A. Warrant that equipment and all work is installed in accordance with good workmanship practice. All equipment shall be installed in accordance with the Manufacturer's recommendations and shall meet the requirements specified. Any equipment failing to perform or function as specified shall be replaced with complying equipment without cost to the Owner. Warranty shall commence upon acceptance of substantial completion of construction by the Owner. Sign-off of individual equipment start-up procedures shall not activate the warranty commencement.

B. Guarantee against defects in workmanship and materials; repair or replace any defective work, material or equipment within one year from date of formal written warranty commencement. Longer product warranties provided by individual equipment manufacturers shall supersede this one year guarantee; however, the Contractor shall maintain the one year workmanship and materials guarantee for installation of such equipment. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.10 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall consist of marked-up Drawings as defined elsewhere in the Specifications. Refer to Division 1 for quantities, special formatting, and additional requirements.

2. The Contractor shall keep one complete set of the original Drawings on the project site on which shall be recorded any deviations or changes from such Drawings made during construction. These drawings shall become the Record Drawings, shall be kept clean and undamaged, and shall not be used for any other purpose other than recording deviations from the original Drawings. At the end of the project, the Contractor shall make electronic .pdfs of these drawings and transfer them onto a portable memory device. Both hard copy drawings and the portable memory device shall be provided as Record Drawings.
3. After the project is completed, the Record Drawings shall be delivered to the Architect/Engineer for inclusion into the Operating and Maintenance Manuals, as a permanent record of the installation as constructed.

1.11 SITE REPORTS AND PUNCHLISTS

A. The Engineer may visit the site periodically during construction and provide written Construction Observation Reports to the Contractor identifying areas where installation does not meet the intent of the Contract Documents. The Contractor shall provide a written response to these reports within 5 business days, indicating the reason the installation is out of compliance with the Contract Documents. After review, the Engineer may or may not require the Contractor to correct the installation. The Contractor shall correct the installation unless the reason for non-compliance is accepted, in writing, by the Engineer or Owner.

B. Final Punch List

1. The Engineer will visit the site to perform a scheduled Final Punch List to identify areas where the installation is incomplete or does not meet the intent of the Contract Documents.
2. If the Engineer is requested to perform the Final Punch List prior to the Contractor being 100% complete with their scope of work, the Contractor shall furnish a Contractor's Completion List, indicating all incomplete work. This list shall be furnished to the Engineer a minimum of 24 hours prior to the scheduled Final Punch List.
3. The Contractor shall respond to each punch list item along with a date, indicating that the item has been completed or corrected.
4. A copy of the Final Punch List with the Contractor's responses shall be included on the Operating and Maintenance Manual.

C. Where on-line documentation management services or project management software requires the author/initiator of a corrective action to close it, and the Engineer is the author/initiator, the following shall apply:

1. When the corrective action is reported as corrected/complete, by either the responsible Contractor or the Construction Manager, the Engineer will assume that the parties responsible for construction have reviewed and approved the correction.
2. By closing the corrective action, the Engineer is in no way approving nor assuming responsibility for the installation.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials used on this project shall be new and listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, etc.or as approved by the local Authority Having Jurisdiction. Equipment and materials shall be installed or used in accordance with instructions included with the listing or labeling. Where possible, the same brand or manufacturer shall be used for each type of material or equipment. such as.

B. Equipment and materials for the construction shall be the responsibility of the Contractor and shall be protected by the Contractor until formally accepted by the Owner.

C. All Manufacturers of equipment shall verify to the satisfaction of the Contractor and Engineer that their equipment will function properly under the conditions of use, as shown on the Drawings and as specified herein. Dimensions, weights, operating characteristics and all other related appurtenances shall be verified before submittal of shop drawings.

2.2 MATERIAL SUBSTITUTIONS

A. Bids shall be based upon the specified products, suppliers or listed alternatives. The Drawings and Specifications are based on the products specified by type, model, size and suppliers if indicated and thus establish minimum qualities which substitutes must meet to qualify for review.

B. Should the Contractor propose to furnish materials, equipment and/or suppliers other than those specified, submit a written request for substitutions to the Architect or Engineer in accordance with Division 1 requirements. The request shall be an alternate to the original Bid and shall be accompanied with complete descriptive (manufacturer, brand name, catalog number, supplier name and references, etc.) and technical data for all items. Indicate any additions or deductions to the base Bid price.

C. Where substitutions alter the design or space requirements indicated in the Contract Documents, the Contractor shall be responsible for the revised design and construction including the costs of all associated trades involved. No costs associated with the use of a substitution shall be borne by the Owner.

D. Acceptance or rejection of the proposed substitutions shall be subject to approval of the Architect or Engineer. If requested, the Contractor shall submit inspection samples of both the specified and the proposed substitute items for review.

E. In all cases where substitutions are permitted, the Contractor shall bear any and all extra cost of evaluating the equality of the material and equipment to be installed.

F. Where only one Manufacturer or supplier is named in the Contract Documents, the system or equipment shall be provided as specified.

G. Verbal requests or approvals of substitutions shall not be binding on the Architect, Engineer or Owner.

PART 3 - EXECUTION

3.1 SAFETY

A. The Contractor shall follow all safety requirements as defined herein, as described in Division 1 and as defined by Owner safety protocols.

B. Work shall be performed on de-energized equipment in accordance with NFPA 70E.

C. Should suspected hazardous materials be encountered, Contractor shall adhere to procedures, methods and regulations of the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) and immediately notify Owner.

3.2 COORDINATION

A. Take all field measurements necessary and assume responsibility for the accuracy.

B. If any work is fabricated or assembled off-site, assume responsibility for the accuracy of such pre-manufactured assemblies.

C. Install work that is to be concealed within the building construction in sufficient time to secure proper location without delay to the work of other trades.

D. Assume responsibility for location of chases, other openings through masonry and concrete construction. When work cannot be installed concurrent with building construction, arrange for rough-in boxes, sleeves, inserts and other items, as necessary for installation thereof at a later date.

E. If any work is installed so that the architectural design cannot be adhered to, Contractor is responsible for making such changes as Architect may require. Before installing work, report any interferences between work of this Division and work of other Divisions to Architect as soon as discovered. Architect will determine which work must be relocated, or make adjustments to maintain clearances, maximum headroom and to avoid conflict with other work.

F. Become familiar with the construction where work attaches. Review Structural Drawings for coordination of openings. Cut no structural members or slabs without Architect's and/or Structural Engineer's written approval.

G. Exercise caution when working in areas where concealed systems or materials may exist. Any costs for repair of damage incurred shall be the responsibility of Contractor causing the damage.

3.3 PROTECTION

A. All finished surfaces shall be protected from damage and spills during construction.

1. Protect finished floors with a heavy duty flexible fiber reinforced floor protection board - Ram Board or equal.
2. When setting up pipe cutting and threading machines, protect area against staining and abrasion. Provide plywood protection over Ram Board underlayment.
3. Protect finished surfaces from chips and cutting oil by use of a chip receiving pan and oil proof cover.

4. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
5. Protect finished surfaces from paint droppings, insulation adhesive, etc. by use of drop cloths.

B. The Contractor shall provide protection for any roof areas that will be affected by this scope of work. The roof protection shall be positioned such that it provides protection from falling objects such as tools and materials.

C. The cost of correcting any such condition will be charged against the respective Contractor.

3.4 EQUIPMENT INSTALLATION

A. Install equipment in accordance with equipment manufacturer's published installation instructions.

B. Should the Drawings and/or Specifications include procedures that exceed or call for materials that differ from the manufacturer's instructions, the Contractor shall follow the Drawings and/or Specifications. This requirement does not release the Contractor from the obligation to follow all other published instructions and installation recommendations. Contractor shall make Engineer aware, in writing, of discrepancies between the Drawings and Specifications and the manufacturer's published installation instructions, and/or confirm Engineer's design intent, prior to installation of the equipment. Failure to comply may result in reworking the equipment installation or replacement of materials associated with the equipment at no additional cost to the Owner.

3.5 CUTTING AND PATCHING

A. All cutting and patching in construction as necessary for installation of this work shall be the responsibility of this Division and performed by the Tradesmen related to that specific Division of work. Subcontract this work to the appropriate Trade Division.

B. Do not cut any structural member, including but not limited to steel framing and structural floors, without specific permission from the Architect and/or Structural Engineer.

C. Do not cut openings in roof or floor construction without specific permission from the Architect and/or Structural Engineer. Existing roof warranty must be maintained.

D. Where locations of penetrations are inaccurate or where building components are improperly cut by inadequate methods, the Contractor in error shall be responsible for complete repair.

E. The Contractor shall assume responsibility for removing and replacing existing ceiling tiles as required for installation of all work. Areas include that as outlined by the project scope and areas outside the scope where the Contractor is required to make connections to existing systems and install new work. Damaged tiles shall be replaced.

3.6 SERVICE SHUTDOWNS

A. This project involves remodeling of existing areas in an operating facility. Plan work including alterations and connections to existing facilities, to permit carrying on normal building functions. When necessary to temporarily interrupt a service, shutdowns shall be scheduled through the Owner and shall be done at a time as directed by the Owner. No additional compensation shall be allowed for these shutdown periods even though premium time work may be required unless specifically defined in Division 1.

B. Provide temporary service to equipment or systems that cannot be shut down, and as determined by Owner, or as described in the Contract Documents. Remove temporary services when permanent work is completed

C. Provide a minimum of one week notice to the Owner before any service shutdown is scheduled.

3.7 INDOOR AIR QUALITY

A. All occupied areas of building shall remain free from odors, fumes, dust and smoke generated from installation of material and equipment.

B. Arrange with the Owner to schedule isolation of areas where paints, adhesives, solvents, etc., will be used. Areas shall remain isolated until all materials have cured sufficiently as to stop out-gassing of fumes or odors and area has been ventilated to remove all detectable traces of odors and fumes.

C. Provide temporary partitions and air seals to prevent the migration of airborne contaminants from unoccupied areas to occupied areas.

END OF SECTION

SECTION 270101 - TECHNOLOGY SUPPLEMENTAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED CONTRACT DOCUMENTS

A. Refer to 27 01 00: Technology General Provisions for additional Project requirements

1.2 DESCRIPTION OF WORK

A. The following general terms as used within the context of the Technology Contract Documents shall be defined as follows:

1. "Technology" shall refer to all low voltage systems, related infrastructure and conduit/backbox rough-in work indicated on the Division 27 and 28 Contract Documents.
2. "RCDD" shall be defined as Registered Communication Distribution Designer.
3. "BICSI" shall be defined as Building Industries Consulting Services International.
4. One EIA rack space or panel height (denoted as 1U) shall be defined as being 1.75 inches in height.

B. The Structured Cabling System shall utilize a network of various cable types and configurations to support systems including, but not limited to, data and voice. Additional cable types may be required to meet various system requirements and shall be specified elsewhere. Changes in the quantity and/or types of cables required shall be documented and submitted to the Engineer for approval prior to installation.

C. Cables and terminations shall be provided and located as shown, and in the quantities indicated on the Drawings.

D. Fiber optic cables shall terminate on modular patch panels and/or in fiber termination enclosures designed specifically for this purpose, and located in all demarcation and termination points shown on the Drawings.

E. All cables and terminations shall be identified at all accessible locations, and at both ends. All cables shall terminate in an alphanumeric sequence at all termination locations as indicated in these Specifications.

F. All copper cable terminations shall comply with and be tested to the latest revisions of TIA/EIA 568 standards for Category 5e, Category 6 and/or Category 6A installations.

G. Available and unused pairs between the Equipment Room (ER) and Horizontal Cross Connect(s) (HC) shall terminate and shall be identified as spare at each location and shall carry a unique sequentially numeric identifier at both ends. Station cables shall terminate on one, two or three gang wall plates equipped as shown on the Drawings.

H. All cables installed through pathways that are installed underground or in concrete slabs in direct contact with soil shall be cables rated suitable for use in wet locations.

I. Structured Cabling System

1. The Structured Cabling System shall be installed as indicated on the Drawings. The system shall consist of the backbone and horizontal cabling and hardware required to provide connectivity as called for on the drawings
2. The Structured Cabling System shall consist of the following components:

   a. Work Area

      1) The Work Area consists of the Telecommunications Outlet (TO) terminated on the end of the horizontal cable and provides modular connectivity to a single point device. The Contractor shall provide the required connectivity in close proximity to the device.
      2) In addition, the Contractor shall provide and install all modular cords from the Work Area to the device or branch, as required to complete and test for the Channel Link configuration as set forth in the latest revisions of the TIA/EIA 568 standards.
      3) The Contractor shall provide any cabling required between devices to create a branch or bus for systems not utilizing the UTP horizontal distribution system.
      4) Unless otherwise indicated on the Drawings, it shall be the responsibility of the Contractor to properly terminate cabling to their respective devices. All cabling shall be 100% tested by the Contractor to assure specified performance.

   b. Horizontal Cabling

      1) The Horizontal Cabling connects the Work Area to the HC. Any exceptions to the design of this cabling as detailed on the Drawings must be stated in writing and proven incompatible, or in violation of local codes or standards. It is imperative that the Structured Cabling System be installed as designed to create a fully operational system without any restrictions, and to provide maximum flexibility for future use.
      2) All continuous pathways, such as conduit, cable tray, raceway, etc., required to support the cabling shall be provided by the Electrical Contractor.
      3) All non-continuous, or non-rigid pathways, such as J-hooks, inner-duct, etc., required to support the cabling shall be provided by the Technology Contractor.

   c. Cross Connect Hardware

      1) The Cross Connect Hardware shall link all of the subsystems together at the HC, Intermediate Cross Connect (IC), and/or the Main Cross Connect (MC) locations. The Cross Connect Hardware shall consist of termination blocks, patch panels, racks, labeling hardware, cross connect wire, and patch and equipment cables for providing circuit connections and identification. All components required for the cross connects and identification of this equipment shall be provided by the Contractor, and be electrically and performance compatible with the horizontal and backbone cabling to assure signal quality.

   d. Administrative Documentation and Record Keeping

1) All cable path and cross connect field-engineering changes and records required shall be provided by the Contractor and shall be subject to approval by the Engineer. In addition, all labeling for the cables, cross connect blocks, patch panels, outlets, etc. shall be provided and installed by the Contractor. Other Technology Systems Contractors shall be responsible for placing labels on the cables and equipment they provide.

1.3 WORK INCLUDES

A. The Electrical Contractor is responsible for all work scope included in the Division 27 Contract Documents. Therefore, any reference to the "Electrical" Contractor (EC) or the "Technology" Contractor (TC) shall explicitly refer to the Electrical Contractor. Should the Electrical Contractor require the services of the separate Technology Sub-Contractor to meet Division 27 requirements, work scope can be divided as indicated in the Division 26 and 27 Contract Documents.

B. The Electrical Contractor is responsible for all work scope included in the Division 26 Contract Documents and applicable Division 26 scope indicated in the Division 27 Contract Documents. A separate Technology Contractor is responsible for all work included in the Division 27 Contract Documents unless otherwise indicated in the Division 27 Contract Documents.

C. Technology system Work includes:

1. All Technology Systems included in Division 27 drawings and specification.
2. All Technology Systems Cable Trays, Conduits and Boxes, including pull wires, for all systems specified in Divisions 27 .

1.4 ALTERNATES

A. Division 27 does not have alternates.

1.5 SUBMITTALS

A. Prior to commencing work, submit product data and/or shop drawings for Technology equipment, materials and systems as required in each individual Division 27 [and 28] Specification section. Provide all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.

B. Submit product data for the following. Refer to specific Specification sections for additional requirements - NOTE that the list below is a guide encompassing most of but not all possible items that would require submittal, each project shall have the applicable submitted for approval.

1. Contractor Qualifications

2. Copper Cabling
3. Low Voltage Protection Devices
4. Faceplates
5. Modular Connectors
6. Patch Panels
7. Paging Systems

8. Security Card Access and Security Surveillance Systems
9. Any other specified system or equipment not listed

1.6 CONSTRUCTION DOCUMENTATION

A. Coordination Drawings:

1. Supply HVAC Contractor information necessary for the development of coordination drawings. Information shall include but not be limited to: locations and sizes of Technology equipment and devices; conduit routing and sizes; and required service clearances affecting the work of other trades. How this information is supplied shall be discussed and decided between all trades.
2. Before supplying information to the HVAC Contractor, coordinate locations of all floor, wall, and roof penetrations including sleeve requirements with General Trades. Coordinate locations and types of all access doors with the Architect and General Trades.
3. Before supplying information to the HVAC Contractor, provide to the Architect and/or Structural Engineer information indicating the size and location of all penetrations through floor slabs. The Contractor shall make all adjustments as required by the Architect and/or Structural Engineer.
4. Contractor shall approve Coordination Drawings prior to Submittal to Architect for review and must indicate acceptance of illustrated conditions by attaching their endorsement to each Drawing.

1.7 GUARANTEE AND WARRANTIES

A. The Contractor, within ten (10) business days of project completion shall fully complete and submit all documentation to the manufacturer as required to implement the extended warranty period. Coordinate guarantee and warranty requirements with Division 1 Specifications.

1.8 CLOSEOUT DOCUMENTS

A. Record Drawings:

1. Record Drawings shall indicate the location of all underground, under floor and concealed conduits [including the location of all utility service entries].
2. Record Drawings shall indicate rated walls where firestop materials have been applied.
3. Record Drawings shall include all field changes.
4. Actual field locations of pathways, risers, shafts, etc.
5. Updated rack elevations
6. Updated detail sheets

B. Operating and Maintenance Manual (OMM)

1. Once submittals are completed, provide an OMM index to the Engineer for review. Once index in approved, submit an electronic copy of the OMM to the Engineer for acceptance.

2. Furnish electronic Portable Document Format (PDF) of Operating and Maintenance Manuals. Refer to Division 1 Specifications for additional requirements.
3. Each OMM shall be assembled into one electronic file or multiple files broken up by section if the file size is larger than 15Mb.

4. Combine all electronic files and arrange as follows, unless directed otherwise by Division 1. If a section listed below does not apply to the Project, renumber sections accordingly. Multiple files broken up by section are allowed if file size is greater than 15Mb.

    a. First Page --- Title of Project, Owner, Address, Date of Submittal, Name of Contractor and Name of Engineer, including contact information, phone number and email addresses.
    b. Second Page --- Index. Index shall include hyperlinks to each section listed.
    c. First Section --- Written description of system contents including where actually located in building, how each part functions individually, and how system works as a whole. Conclude with a list of items requiring service and either state the service needed or refer to the Manufacturer's data in the file that describes the proper service.
    d. Second Section --- A copy of each shop drawing and catalog data sheet with an index at the beginning of the section. Index shall include hyperlinks to each item listed.
    e. Third Section --- A copy of each Manufacturer's operating and maintenance instructions with an index at the beginning of the section, and a copy of each Manufacturer's start up report.
    f. Fourth Section --- A copy of each wiring diagram utilized in the installation.
    g. Fifth Section --- A copy of all test results, in chart form, performed by the Contractor.

        1) Include electronic format of all testing results on portable memory device (Optical media or USB stick)

    h. Sixth Section --- Copies of all warranties, approvals, etc.
    i. Seventh Section --- Owner training sign-in sheets and a list of all digitally recorded training sessions.

        1) Include electronic format of all recorded training sessions on portable memory device (Optical media or USB stick).

    j. Eighth Section --- Record Drawings.
    k. Ninth Section --- A list of attic stock furnished for the project.
    l. Tenth Section --- Certificates of destruction of PCB contaminated materials as identified in the Technology Demolition Section.
    m. An index shall be included at the beginning of each individual section.

5. The electronic OMM shall be delivered to the Owner and Engineer on portable memory device or optical media - Owner shall be provided with 5 copies on separate portable memory devices or optical media and the Engineer shall be provided with a single copy.

    a. OMM index page shall have cross-reference links to each section.
    b. Sections containing more than 30 pages shall have a section index with cross-reference links.
    c. PDF text shall be recognizable and shall be searchable by use of a "Ctrl-F" or "find text" function.

1.9 CONTRACTOR QUALIFICATIONS

A. The Contractor shall be fully qualified to perform installations as described on the Contract Drawings and within these Specifications. The following qualifications apply to all Low Voltage Systems, unless otherwise specified in the individual Specification Section.

B. The Contractor shall have been active in bidding, being awarded, and performing work consistent with that which is indicated on the Contract Documents for a period not less than five (5) years.

C. The Contractor shall possess current certifications by the manufacturer for the installation and maintenance of all systems being provided.

D. The Contractor shall possess current BICSI certifications for the installation and maintenance of all Structured Cabling and associated equipment being provided.

E. The Contractor shall maintain an installation staff whose sole function is the installation of Structured Cabling and associated equipment and shall not utilize additional personnel obtained by means of a temporary placement or staffing agency.

F. The Contractor shall not utilize apprentice or trainee personnel for the pulling or termination of Structured Cabling. Furthermore, apprentices or trainees may only assist in the pulling of Structured Cabling. The primary laborer for the pulling of Structured Cabling must be a certified installer.

G. All installation personnel assigned to the task of pulling or terminating cabling shall possess a current certification by BICSI and/or the manufacturer of the cabling products being installed.

H. The Contractor's installation staff shall consist of 85% certified installation personnel. The remaining shall be either apprentice installation personnel or laborers under full time employment by the Contractor. Of the certified staff, 40% shall be Journeymen/BICSI Installers. The remainder shall be BICSI Level I or Level II Installers. The Engineer reserves the right to wave these requirements.

I. The Contractor shall have a dedicated RCDD assigned to the project, as Project Manager, who shall be the sole point of contact for the Engineer or Owner. The RCDD/Project Manager shall provide regular project updates to the Engineer as to percentage of job completed broken down by category of work, for example, horizontal cabling, backbone copper, backbone fiber, system A, system B, etc., the status of any unforeseen circumstances, and/or changes to the project design necessitated by field conditions.

J. The Contractor shall, with bid qualification, submit the following information for review.

1. An unaltered copy of the Project Manager's RCDD Certificate.
2. An unaltered copy of the Contractor's certification by the respective structured cabling manufacturer for the installation, testing and warranty of the materials being installed.
3. Unaltered copies of any and all other certifications required herein, including, but not limited to data network electronics, telephone system, audio/visual systems, etc.
4. A list of sub-contractors with key contact information and all certification information as described elsewhere in these Specifications.

5. A list of assumptions and or exceptions utilized while compiling the Bid submission.
6. A list of projects of similar size and scope that the Contractor has completed in the last two years.

1.10 FIELD ENGINEERING AND PROJECT MANAGEMENT

A. It shall be the responsibility of the Contractor to provide all cable path engineering required by unforeseen field conditions.

B. The Contractor shall inform the Engineer as to changes in design required by field conditions, as soon as possible, prior to installation. Arbitrary changes in the design are unacceptable, and shall be reworked to the extent of removal and re-installation based on the original design, unless pre-approved in writing by the Engineer, or proven necessary due to the unforeseen field conditions.

C. Other Technology Systems Contractors, whose systems will utilize the Structured Cabling System, shall certify the design of the structured cabling system according to the specifications of the equipment being installed.

D. Prior to installation, the Contractor shall verify this certification with the Other Technology Systems Contractors and inform the Engineer immediately of any disparity in the design. Should the installation prove unable to support a given system, and the system vendor has not signed off on the cabling design, the cost of any required rework of the cabling installation shall become the responsibility of the Contractor and the Vendor to resolve at no additional cost to the Owner.

E. Additional engineering, diagrams, records, and project management shall be provided as described elsewhere in the Specifications. Diagrams and records shall be coordinated to avoid duplication of efforts and to consolidate documentation.

F. It shall be the responsibility of the Contractor to identify and notify the Engineer immediately of any issues causing the cabling and/or equipment to be installed in such a way as to cause that part of the installation to be in violation of the accepted standards and practices governing these types of installations. Failure to do so shall place the burden of the necessary repairs on to the Contractor.

PART 2 - NOT USED

PART 3 - EXECUTION

3.1 CABLE ROUTING

A. Where the Contractor is required to install non-continuous pathways for the Structured Cabling System, the Contractor shall keep hallway crossover to a minimum. Furthermore, non-continuous pathways shall be routed so as to follow logical paths parallel and perpendicular to the building structure. Diagonal pathways are prohibited, unless absolutely unavoidable, and approved by the Engineer.

B. Where duct, cable trays or conduit are not available, the Contractor shall bundle, in bundles of 50 or less, horizontal distribution wiring with Mille-ties or Velcro snug, but not deforming the cable geometry. Where cable bundles are to be supported by J-hooks, the J-hooks shall be attached to the building structure and framework per local codes and regulations at a maximum of five (5) foot intervals.

C. Cable support methods of binding cabling shall not be installed in such a fashion to as to bend, crimp or deform the cabling in any way so as to alter the electrical or transmission characteristics of the cabling.

D. Plenum rated Mille-ties or Velcro shall be used in all cable pathways and technology equipment rooms. Tywraps shall not be used.

E. The combined length of jumpers, or patch cords and equipment cables in the Telecommunications Space and the Work Area shall not exceed 10m (33 ft) unless used in conjunction with a multi-user Telecommunications Outlet.

F. The combined length of horizontal cabling, jumpers, or patch cords and equipment cables shall not exceed 100 meters (328 feet).

G. A minimum of two horizontal cables shall be routed to each Work Area, unless otherwise noted on the Drawings. The exact compliment of cabling and terminations in any given Work Area is detailed on the Drawings.

H. Horizontal pathways shall be installed such that the minimum bending radius of the horizontal cables is kept within manufacturer specifications both during and after installation.

I. Telecommunications Pathways, spaces and metallic raceways, which run parallel with electric power or lighting cables or conduits, which is less than or equal to 480 Vrms, shall be installed with a minimum clearance of 50 mm (2 inches).

J. The installation of cabling shall maintain a minimum clearance of 3 m (10 ft) from power cables or conduits in excess of 480 Vrms.

K. No telecommunications cross connects shall be physically located within 6 m (20 ft) of electrical distribution panels, or step-down transformers, which carry voltages in excess of 480 Vrms.

L. Each run of UTP/ScTP cable between the cross connect in the Telecommunications Room and the Telecommunications Outlet shall be continuous. Splicing of any cable is prohibited.

M. The Contractor shall provide all devices for routing the cabling as indicated on the Drawings, and as required by the manufacturer of the Structured Cabling System, so as to maintain the long-term health and operability of the Structured Cabling System.

N. Continuous conduit runs shall not exceed 30.5 m (100 ft) or contain more than two (2) 90-degree bends without utilizing appropriately sized pull boxes, unless otherwise indicated in these Specifications or on the Drawings.

O. The Contractor shall verify the proper installation technique and sizing of the raceway system prior to installation of the cabling.

P. All horizontal pathways shall be designed, installed and grounded to meet applicable local and national codes.

Q. The number of horizontal cables placed in a cable support or pathway shall be limited to a number of cables that will not affect the geometric shape of the cables.

R. Maximum conduit pathway capacity shall not exceed a 40% fill with the exception of perimeter and furniture fill, which is limited to 60% fill for moves, adds and changes, unless otherwise noted on Drawings.

S. Horizontal distribution cables shall not be exposed in the Work Area or other locations with public access, unless otherwise noted on Drawings.

T. Cables routed in a suspended ceiling shall not be draped across the ceiling tiles. Cable supports shall be mounted a minimum of 75 mm (3 inches) above the ceiling grid supporting the tiles.

U. Each cable shall be run in a homerun configuration, and shall contain no bridges, taps or splices, except where required specifically by the manufacturer of a technology system, utilizing a dedicated cable run.

V. Cabling shall not be attached to any mechanical, electrical or technology system other than those specifically noted in the Contract Documents.

W. Cabling shall maintain clearance from Line Voltage cabling and devices at all times, and shall be spaced from these devices so as to comply with the TDMM, the NEC, and any other local codes or regulations.

3.2 PULLING TENSION

A. The maximum pulling tension for all cables shall not exceed the respective manufacturer's specifications, or the limits as published in current edition of the TDMM.

3.3 BENDING RADIUS

A. The Contractor shall adhere to the manufacturer's requirements and as indicated in the BICSI Telecommunications Distribution Methods Manual (TDMM) for bending radius and pulling tension of all data and voice cables. Where the manufacturer's specifications differ from those cited in the TDMM, the Contractor shall abide by the greater bending radius and the lesser pulling tension.

B. The minimum bending radius for any cable shall not exceed the respective manufacturer's specifications.

C. In spaces with UTP/ScTP cable terminations, the bending radius for all 4-pair cables shall not exceed four times (4x) the outside diameter of the cable and ten times (10x) the outside diameter of a multi-pair cable, unless this violates the manufacturer's specifications.

D. During the actual installation, the bending radius of a 4 pair cable shall not exceed eight times (8x) the outside diameter of the cable and ten times (10x) the outside diameter of a multi-pair cable, unless this violates the manufacturer's specifications.

3.4 SLACK

A. In the Work Area, a minimum of 300 mm (12 inches) shall be left for UTP/ScTP, while 1 m (3 ft) shall be left for fiber cables.

B. In Telecommunications Spaces a minimum of 3 m (10 ft) of slack shall be left for all copper and fiber cable types. This slack shall be neatly managed on trays or other support types.

3.5 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

A. All cabling used throughout this project shall comply with the requirements as outlined in the National Electrical Code Articles 725, 760, 770, and 800 and the appropriate local codes. All copper cabling shall bear CMP (plenum rated), CM/CMR (riser rated) and/or appropriate markings for the environment in which they are installed. All fiber optic cabling shall bear OFNP (plenum rated), OFNR (riser rated) and/or appropriate markings for the environment in which they are installed.

B. The Contractor shall be responsible for the determination of the necessity of limited combustible, plenum, and/or non-plenum rated cabling, and shall be aware of any local codes regarding the use of these cable types.

C. Cables shall not be attached to or supported by fire sprinkler heads or delivery systems or any environmental sensor located in the ceiling space.

D. All outdoor rated inter-building fiber optic and copper cables shall transition to an indoor rated cable within fifty-feet (50') of entering a building. All indoor rated cabling shall meet the restrictions of the environment in which they are installed.

3.6 COORDINATION

A. Consult the Contract Documents and Submittals pertaining to the work for other trades. Review the field layouts for all trades and make adjustments accordingly in laying out the Division 27 work.

B. Examine the work of all other trades when it comes in contact with, or is covered by, work in this Division. Do not attach to, cover up, or finish against any defective work, or install work in a manner which will prevent proper installation of the work of other trades. Technology Contractor shall be responsible for the costs of adjustments required.

3.7 PROTECTION

A. When setting up for fiber optic splicing or installing connectors, provide collection system for glass particles.

3.8 PRODUCT HANDLING

A. Pay all costs for transportation of materials, equipment to job site.

B. Provide all scaffolding, tackle, hoists, rigging necessary for placing electrical materials and equipment in their proper place. Scaffolding, hoisting equipment: comply with applicable Federal, State, and Local regulations. Remove temporary work when no longer required.

C. Arrange for packaging of equipment, which must be hoisted, so that there will be no damage or distortion caused by hoisting operation.

D. Store Electrical equipment, etc., in a dry location and protect all Electrical equipment from dirt and moisture until the building is ready to receive them.

E. Coordinate location of stored items with other trades. Where necessary, store materials and equipment on movable carts so they may be moved when interfering with the work of other trades.

3.9 DAMAGE AND EMERGENCY REPAIRS

A. Assume responsibility for any damage to new or existing building components caused by work provided as part of Contract Documents. Repair all damage without extra cost to Owner.

B. Owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's guarantee or relieving him of responsibility during warranty period.

C. Restore roads, grounds, paving, building components, etc., to their original condition whenever this work causes damage.

3.10 CLEANING

A. At all times keep premises and building in neat and orderly condition, follow explicitly any instructions in regard to storing of materials, protective measures and disposing of debris.

B. After all tests and adjustments have been completed, clean all equipment leaving everything in working order at the completion of this work. Clean all equipment of dirt, dust, grease, oil, debris and paint, after all other trades have completed their work.

C. All debris created by the execution of this work shall be removed as directed by the Architect or Owner.

D. Upon completion of work remove all tools, equipment and surplus materials.

3.11 PAINTING

A. Finish painting is included under Division 9 - Finishes, except where specifically called for in Basic Materials and Methods.

B. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.

C. No equipment or conduits shall be field painted before being connected or terminated. Where in-field painting occurs, ensure components required for continuation of grounding systems are protected from paint until connected and installed.

D. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match the existing finish.

E. Under no circumstance shall any open cabling be painted; it is the responsibility of the contractor to protect it.

3.12 INDOOR AIR QUALITY

A. Provide temporary ventilation and/or filtration systems of sufficient size and quantity to ensure complete removal of all odors, fumes, and airborne contaminants generated. Maintain 25 feet clearance from all temporary exhaust outlets to all active building outdoor air intakes.

B. Arrange with Owner to override the HVAC system control of night setback functions to assist with ventilation of building.

C. Comply with SMACNA guideline "IAQ Guidelines for Occupied Buildings Under Construction" Second Edition - 2007.

END OF SECTION

SECTION 270300 - CABLING SYSTEMS ADMINISTRATION

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Cabling and Equipment Labeling

B. Installation Documentation

1.2 DESCRIPTION OF WORK

A. All work shall be in compliance to TIA/EIA 606.

B. The Contractor shall compile all documentation required under this Section, both hard copy and electronic, and include the information in the Operating / Maintenance Manuals.

C. All electronic documentation shall be recorded onto a MS Windows readable CD. All files contained on the CD shall be in the native format of the software in which it was generated, as well as a plain text format. A copy of any viewing software shall be made available at no additional cost to the Owner and shall also be recorded onto the CD, or be recorded onto additional CD's as required.

D. Review and coordinate cabling and equipment labeling system with Owner.

PART 2 - PRODUCTS

2.1 TAPE BASED LABELS

A. All tape-based products shall be manufactured for the purpose of identifying flexible communications cabling.

2.2 PLACARDS

A. All placards shall be constructed of a laminated polyvinyl process, and shall be engraved. All placards shall be black with white letters unless otherwise noted.

PART 3 - EXECUTION

3.1 LABELING

A. Work Area Floor Plans

1. Each Technology Room shall contain a lexan covered copy of the floor plan(s) associated with the work area outlets serviced by the Technology Room.
2. The size of the plans shall be equal to the size of the Contract Drawings, unless Contract Drawings exceed 30" x 42", in which case half size prints are to be utilized.
3. The plans shall be affixed by means of compression between the lexan cover and the backboard to which it is mounted. The Contractor shall make provisions to assure that the plans cannot accidentally fall from behind the lexan.

4. For cross connect locations that are smaller than TIA standard locations, half size plans shall be permitted.
5. The Contractor shall utilize the final set of Record Drawings when providing these plans.

B. General Labeling Requirements

1. The Contractor shall label all cables, faceplates, cabling enclosures, patch panels, termination blocks, equipment enclosures, racks and related hardware.
2. All labels shall be permanently attached, and shall be constructed of materials so as to assure the lifespan of the identification marker to be equal or greater than that of the device being identified.
3. The identification tag or placard shall be self-adhering or attached by means of a permanent adhesive listed for the application, or other permanent mechanical means.
4. All means of identification shall be visible and clearly identifiable by personnel in charge of maintaining the cabling infrastructure.
5. All labels shall be machine generated onto adhesive labels or tags, or engraved on plastic laminated placards. Use of “P Touch” tape or other domestic/light duty type of label is unacceptable.
6. All laminated placards shall have a black field with white letters, unless otherwise noted.

C. Faceplate Labeling

1. All faceplates shall be labeled with the Technology Room and Faceplate Number.
2. The faceplate number shall be derived based on the room in which the faceplate is located and a sequential number.
3. The label shall be permanently affixed to the faceplate in a location specifically engineered by the manufacturer to contain such information, or shall be neatly engraved directly on the faceplate and painted to facilitate easy recognition of the information.
4. The individual jack positions shall be identified with sequential letters, either by means of a pre-manufactured engraving or molding, or by installation of a machine generated label installed in a location specifically designed to hold such a label.

D. Patch Panel Labeling

1. All patch panels shall be labeled as to the identity of the patch panel.
2. The patch panel identification shall be derived based on the rack in which it is mounted and a sequential letter.
3. The label shall be installed in the space provided by the manufacturer for this purpose. If no space is provisioned, the Contractor shall provide a laminated placard that shall be engraved with the identification of the patch panel, and shall be mounted in the upper right corner of the patch panel, but shall not block the proper installation of the patch panel.
4. All ports shall be labeled with the ID of the faceplate terminated at that port, and the associated jack letter from the faceplate.

E. Rack Labeling

1. All racks shall be labeled as to the identity indicated on the Drawings. The label shall be made of plastic laminate and attached at the center of the front top rail of the rack and shall be visible from eye level.

F. UTP Cable Labeling

1. All UTP cables shall be marked at both ends of the cable jacket, at approximately 2” from the end of the sheath, with a self adhesive label.
2. The label shall have the exact location of the point of service (the TR, rack or block ID and port) as well as the exact work area identification (faceplate ID and port letter), at both the work area and cross-connect locations.

G. Pullboxes

1. All pullboxes shall be labeled by the Contractor both internal to the pullbox, and visibly on the cover plate with laminated placards.
2. The identification shall be derived from the room or corridor number and a sequential letter, and shall be identified with the word "TECHNOLOGY". For example: PB113-02, where 113 is the corridor number and 02 indicates that it is the second pullbox in that corridor.

H. Conduits and boxes

1. All conduits, with the exception of work area outlet conduits, shall be tagged by means of a brass tag permanently affixed to the conduit at each end. The tag shall indicate the source Telecommunications Space on the first line, and the final destination Telecommunications Space on the last line. If the conduit route utilizes pullboxes the tag shall also include the ID of the next pullbox in the route, engraved on the second line of the tag.
2. Backboxes used for work area outlets shall have the locations of the stub legibly written in permanent magic marker inside the backbox.
3. Conduit stubs for work area outlets not contained within the same room as the backbox it serves, shall be legibly marked by means of a permanent marker on the exterior of the stub as to the location of the backbox.

3.2 DOCUMENTATION

A. As stated elsewhere in these Specifications, it is the responsibility of the Contractor to maintain as set of Record Drawings and to provide Operating and Maintenance Manuals. In addition, all electronic design documentation shall be corrected to reflect "as-built" conditions, including all spreadsheets and/or databases utilized for labeling and testing. Such documentation shall be turned over to the Owner in the original format without additional compensation to the Contractor, including, but not limited to, all spreadsheets, databases, text files and proprietary file formats from the various testing instruments.

END OF SECTION

SECTION 270400 - TECHNOLOGY FIRESTOPPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work of this Section includes, but is not limited to, furnishing and installing firestopping for fire-rated construction in the following areas:

1. All openings in fire-rated floor, wall, ceiling and roof assemblies, both empty and those accommodating penetrating items.
2. Openings at each floor level in shafts or stairwells.
3. Empty openings intentionally designed as spare openings in fire rated Construction.

B. Penetrating items shall include the following:

1. Cables.
2. Conduit.
3. Raceways.
4. Cable trays.
5. Busways

1.2 QUALITY ASSURANCE

A. General

1. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings required by local building code and as tested by nationally accepted test agencies per fire tests in a configuration that is representative of field conditions. The F rating must be a minimum of one (1) hour but not less than the fire resistance of the assembly being penetrated.
2. Manufacturer¢¢s engineering judgments will be accepted for non-standard applications or where no tested system exists. Drawings for engineering judgments must indicate the UL tested system or systems upon which the judgment is based, in order to evaluate the engineering judgment against a known performance. Engineering judgments shall be approved by the Architect.
3. Firestopping materials and systems shall be capable of closing or filling openings created by:

   a. The burning or melting of combustible materials.
   b. Deflection of materials due to thermal expansion.

4. Firestopping material shall be non-halogenated, lead and asbestos free and shall not incorporate nor require the use of hazardous solvents.
5. Firestop products which dissolve in water after curing are not acceptable.
6. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.
7. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to a Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

C. Manufacturer's Field Representative: The Manufacturer of the firestop material of this Section shall provide a qualified field representative at the site.

D. Pre-Installation Conference: Contractor shall hold a pre-installation conference with representatives of the Architect, Contractor, Installer, Materials Manufacturer and various trades involved in the Work, to review conditions affecting the installation and consistency of manufacturer to be used by all trades.

E. Conform to Manufacturer's printed instructions for installation in accordance with a U.L rated system or Manufacturer¢¢s engineering judgement.

F. Codes and Standards

1. ASTM E 84
2. ASTM E 119
3. ASTM E 814
4. UL 263
5. UL 1479

1.3 SUBMITTALS

A. Refer to Sections 27 01 00 and 27 01 01 for additional requirements.

B. All submittals shall conform completely to the requirements of the Contract Documents.

C. Product Data: For each type of material to be installed, literature shall indicate product characteristics, typical uses, performance, test data and Manufacturer's installation procedures.

D. Shop Drawings: Include U.L. rated system number and details for each type of penetration or configuration.

1. Show typical installation details including:

a. Minimum and maximum allowable annular spacing.
b. Base material composition.
c. Firestop materials selected.
d. Applied thickness required to achieve the hourly rating.

E. Where required, submit Product Data and Shop Drawings to the Authority Having Jurisdiction (AHJ) for review and approval. Information shall include the Manufacturer's assembly detail with UL system number, technical data and installation instructions for each penetration type occurring on the project.

F. Close-out Documents

1. Final approved product data and shop drawings of all materials installed shall be included in operating and maintenance manuals.
2. Record Drawings shall indicate rated walls where firestop materials have been applied.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturer¢¢s labels identifying product and manufacturer, UL label, date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes. Materials shall be stored off the ground and protected from environmental conditions as required by manufacturer.

C. All firestop materials shall be installed prior to expiration of shelf life.

1.5 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, provide for curing in accordance with manufacturer suggested temperature requirements.

B. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

C. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.

D. Do not use materials that contain flammable solvents.

E. Do not install water based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.

1.6 PROTECTION

A. Where firestopping is installed at locations which shall remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

1.7 SEQUENCING

A. Coordinate this work as required with work of other trades.

B. Firestopping shall precede finishing of gypsum board.Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal deck placement or composite deck installation but before placement of concrete.

1.8 WARRANTY

A. Contractor shall provide written certification that all firestopping was installed in accordance with the Manufacturer's written instructions for UL tested assemblies and that all firestop systems installed meet firestopping requirements as herein specified.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials shall meet the requirements specified herein.

B. For applications where combustible penetrants are involved, i.e. insulated or plastic pipe, a suitable intumescent material must be used.

2.2 ACCEPTABLE MANUFACTURERS

A. Specified Technologies, Inc. (STI)

B. 3M

C. Hilti, Inc.

2.3 FIRESTOP MATERIALS

A. Firestop Mortar

B. Intumescent Firestop Sealants and Caulks

C. Elastomeric Firestop Sealants and Caulks

D. Endothermic Firestop Sealants and Caulks

E. Firestop Putty

F. Rough-in Box Inserts

G. Firestop Pillows/Blocks

H. Fire Rated Pathways

I. Firestop Grommets

J. Firestop Collars

K. Wrap Strips

L. Cast in Place Devices

M. Firestop Foams

N. Composite Sheets

O. Intumescent Gaskets

PART 3 - EXECUTION

3.1 GENERAL

A. In an occupied building, permanent firestopping shall be installed within 24 hours of penetrating a fire rated assembly. If permanent firestopping cannot be installed within this time period, temporary firestop pillows/blocks are permitted, where installation allows, until permanent firestop materials can be properly installed.

3.2 INSPECTION

A. Examine the areas and conditions where firestops are to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until the Contractor, in a manner acceptable to the Architect has corrected unsatisfactory conditions.

B. Verify that environmental conditions are safe and suitable for the installation of the firestop products.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. General

1. Provide firestopping for conditions specified elsewhere whether or not firestopping is indicated and, if indicated whether such material is designed as insulation, safing, or otherwise.
2. All firestopping shall be installed in accordance to the UL rated system designed for the application.
3. Grout, Mortar or Gypsum based products shall not be installed in lieu of firestopping material specified herein.
4. All smoke walls (smoke barriers, smoke partitions, etc.), rated or non-rated, shall be firestopped with systems designed to maintain a minimum 1 hour rating or that which is equal to the rating of the wall.

B. Penetrations - Provide firestopping as follows:

1. Where penetrations pass through one or both surfaces of a fire rated floor or wall.
2. Where a penetration occurs through fire rated walls or partitions of hollow-type construction, provide firestopping to completely fill spaces around the penetration, on each side of the wall or partition.
3. Except for slab on grade, where penetrations pass through a non-fire rated floor.
4. The requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening. Upon installation of cabling through sleeve, firestop the remaining open area within the conduit.

C. Where demolition has occurred in rated walls, floors and assemblies, the material used to patch the opening shall match the material used for the assembly construction. Firestopping materials may be utilized upon approval of Architect and Engineer. Materials used shall be provided with submittals. Work performed shall be the responsibility of the Contractor whose work was removed, performed by the appropriate trade.

3.4 PREPARATION

A. Surface to receive firestop shall be free of dirt, dust, grease, oil, oil from release agents, or other matter that would impair the bond of the firestop material to the substrate or penetrating items.

B. Substrate shall be frost free.

3.5 INSTALLATIONS

A. General

1. Sleeves and core-drilled holes shall be sized at least 1-1/2" larger in diameter than penetrating items.
2. Installation of firestops shall be performed by applicators/installers qualified and trained by the Manufacturer. Installation shall be performed in strict accordance with the Manufacturer's detailed installation procedures.
3. Apply firestops in strict accordance with UL rated system designs, and Manufacturer's recommendations.
4. Coordinate with all other trades to assure that all items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other Construction which would conceal penetrations are not erected prior to the installation of firestop.
5. Gun grade sealants and putties shall be tooled into place to insure proper adhesion to penetrations and surrounding surfaces.
6. Where existing penetrations are reused that contain remnants of existing firestop products remain, remove all existing firestopping.

B. Dam Construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating.
2. Placement of dams shall not interfere with functions or adversely affect the appearance of adjacent construction.

C. Field Quality Control

1. Install work in full accordance with rules, regulations, and safety requirements of Federal, State, County and City authorities having jurisdiction over premises. Do not construe this as relieving Contractor from compliance with any requirements of the Specifications which are in excess of Code requirements and not in conflict therewith.
2. Correct unacceptable firestopping and provide additional inspection to verify compliance with this Specification at no additional cost.
3. Finish surfaces of firestopping that is to remain exposed in the completed work to a uniform and level condition.

3.6 LABELING

A. Where firestopping installations occur, Contractor shall provide a label adjacent to each penetration. Label shall include:

1. UL rated system used.
2. Date of installation.
3. Name of installing Contractor

B. Labels shall be furnished by the firestop manufacturer.

END OF SECTION

SECTION 270600 - TECHNOLOGY PATHWAY HARDWARE

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Technology Conduits and Boxes

1.2 DESCRIPTION OF WORK

A. Technology Conduits and Boxes shall refer to all Low Voltage Systems specified within the Technology Specifications. All requirements of this Section shall apply unless specifically noted otherwise in the individual Specification Sections.

B. Pathways shall be installed as indicated on the Drawings and shall meet applicable local and national codes and regulations.

C. Grounding and bonding of pathways shall comply with applicable codes and regulations, in addition to any requirements indicated in these Specifications.

D. Pathways shall not have exposed sharp edges or other surfaces that could cause damage or otherwise cause substandard installation that may come into contact with the Structured Cabling System.

E. The number of cables placed in a pathway has been designed specifically for the installation documented on the Drawings. Deviation from this design is unacceptable. If unforeseen circumstances arise, requiring the redistribution or addition of cabling not previously accounted for in the design, the Contractor shall either contact the Engineer for written approval of this modification or have the RCDD managing the Contractor's efforts implement a solution based on documented standards, and governing local codes and regulations. If the RCDD managing the Contractor's efforts deviates from the designed installation, the RCDD must inform the Engineer immediately. The Engineer shall retain final dispensation as to the appropriateness of the modification. The Contractor shall not exceed the manufacturer's specifications, nor shall the geometric shape of a cable be affected.

F. Elevator shafts shall not be used as pathways.

G. All cabling routed in an open architecture or in a non-continuous pathway shall utilize appropriately sized J-hooks, or other approved means. The maximum spacing between two consecutive J-hooks shall be 60". The maximum fill capacity of any J-hook regardless of size is 40%

H. Bridle rings shall not permitted or used under any circumstance.

I. All pathways installed under the scope of this Contract, whether for routing of cable, future use or spare, shall have an appropriately sized pull string, rope or wire installed. Each end of the string, rope or wire shall be fastened in such a fashion so as to assure its availability in the future, and shall be tagged with the location of the other end.

J. Technology cable trays, cable runways and other communications pathways are for the exclusive use of the low voltage communications cabling, including voice, data, video, security, paging, nurse call and telemetry. Fire alarm, lighting control and building automation cabling is prohibited in Technology Pathways.

PART 2 - PRODUCTS

2.1 TECHNOLOGY CONDUITS AND BOXES

A. The Electrical Contractor shall furnish and install all conduit, boxes, miscellaneous fittings and materials for a complete raceway system installation. All work shall be installed in accordance with the requirements of EIA/TIA-569, BICSI's Telecommunications Distribution Methods Manual (TDMM) when applicable, and as indicated on the Drawings.

B. All conduits shall be a minimum of 1"unless otherwise noted on the drawings, and shall utilize UL Listed hardware designed for use with the conduit and boxes provided. Conduit runs shall not contain more than (2) 90 degree turns prior to termination unless conduit size is increased to the next grade size. Conduit shall not exceed (3) 90 degree turns regardless of size.

C. Conduit runs shall not exceed 100 feet without utilizing a pullbox sized per table 5.8 of the TDMM.

D. All conduits shall be reamed smooth to prevent accidental damage to the cables, and have a non-metallic bushing installed.

E. All conduits stubbed into an open area shall extend 3" to 6" from the finished surface.

F. The Contractor shall coordinate the type and arrangement of receptacles and outlets prior to the installation of any electrical work. The Contractor shall notify the Engineer if discrepancies are found.

G. Any work installed that must later be relocated as a result of the Contractor's negligence in coordinating such requirements shall be done as directed by the Engineer at no additional cost to the Owner.

H. Outlet boxes shall be 4-11/16 inches square with single gang plaster rings, unless otherwise noted. Blank coverplates shall be provided for boxes as indicated on the Drawings as being for rough-in only.

I. Mounting heights shall be as indicated on the Drawings.

J. Support systems for cable trays and cable runways shall not be center hung, unless otherwise noted on the Contract Documents.

2.2 J-HOOKS

A. J-hooks shall be a minimum of 2" wide with radiused edges.

B. J-hooks shall include a cable retention clip

C. J-hooks shall comply with the EIA/TIA-568A

D. Acceptable manufacturers shall be

1. Caddy
2. Cooper B-line
3. Panduit

PART 3 - EXECUTION

3.1 TECHNOLOGY CONDUITS AND BOXES

A. All conduits required for Technology outlets as shown on the Drawings shall be installed complete with pullwires.

B. Provide conduit from each outlet up to the nearest accessible corridor ceiling space, cable tray or other area as indicated on the Drawings, and provide an insulated bushing at each stub.

C. Contractor shall protect cabling from all sharp or rough edges or points.

END OF SECTION

SECTION 271119 - COPPER CABLING TERMINATION HARDWARE

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Faceplates

B. Patch panels

1.2 SUBMITTALS

A. Submittals shall include instructions for installation and maintenance, suitable for inclusion in the Operating and Maintenance Manuals.

B. Submittals shall include descriptive literature for all cabling system components, connections, connectors and a comprehensive bill of materials. Highlight the specific part numbers/descriptive text of the materials to be provided.

1.3 PERFORMANCE AND WARRANTY

A. The Contractor shall furnish and install all system cabling and components as required for a complete system as described elsewhere in these Specifications and as shown on the Drawings.

B. The Contractor shall guarantee all material and installation labor to be free from defects for a period of one (1) year from the date of formal written acceptance by the Owner.

C. System shall carry an industry standard, performance based warranty, by the manufacturer and contractor, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of one (1) year from date of substantial completion.

1.4 RECORD DRAWINGS

A. The Contractor shall submit to the Owner as a condition of final payment and acceptance a single reproducible set of Record Drawings exactly as the System was installed with all cable numbers designated on the Drawings.

PART 2 - PRODUCTS

2.1 OUTLETS

A. Faceplates

1. Contractor shall provide all faceplates, including blank faceplates.
2. All Faceplates shall be available in single, duplex, triplex, quadplex, or sixplex arrangements in a single gang configuration.
3. Faceplates shall be available in eightplex arrangements in a two-gang configuration.
4. Surface mount boxes shall be available in single, dual, quad, sixplex and twelveplex configuration.

5. Contractor shall coordinate faceplate type and color with the Architect and/or Owner. Coordinate with color of other electrical devices in area, if possible.

B. Outlets for Voice and Data

1. Technology outlets shall consist of one, two or three gang outlet box faceplates equipped with 8-pin modular jacks, utilizing EIA/TIA-T568B wiring. All outlet cabling shall terminate on IDC type termination blocks at their associated HC, unless otherwise indicated in the Contract Documents.
2. Field terminable UTP plugs are allowed for final connections to wireless access points, cameras, and other IP devices mounted in or on ceilings. UTP plugs shall not be crimp type - terminations shall be via 110 style or other press fit IDC.

C. Category 6 Outlets

1. All Category 6 Outlets shall meet or exceed Category 6 transmission requirements for connecting hardware, as specified in the most recent revisions of TIA/EIA 568, and related addenda, regarding the Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section, and have readily available numeric test results from ETL for passive model testing and TOLLY for active model testing.
2. The Category 6 outlets shall be capable of being installed on a modular patching faceplate, or as a modular Telecommunication Outlet (TO), supporting all current and future applications designed to run on Category 6 outlets.
3. The Category 6 outlets shall be capable of being installed at either a 45° or a 90° angle in any modular faceplate, frame, or surface mounted box provided by the approved manufacturer, avoiding the need for special faceplates.
4. The Category 6 outlets shall be capable of greater than 750 insertions and 200 terminations.
5. Approved manufacturers

   a. Panduit - TX6 Plus
   b. Siemon - MX6 Jack
   c. Ortronics - Clarity6
   d. CommScope - UNJ600
   e. Leviton - Extreme 6t

2.2 MODULAR PATCH PANELS

A. The modular patch panels shall support the appropriate category, both current and future, designed for the associated connectivity solution.

B. All modular patch panels shall be wired to EIA/TIA 568B.

C. All modular patch panels shall have rear cable management support bar. Cabling shall be lashed in groupings of 6 with Velcro.

D. Modular patch panels shall utilize IDC type connections for terminating horizontal cables, and be able to accommodate 23 AWG and/or 24 AWG cable conductors.

E. Modular patch panels shall be capable of greater than 750 insertions and 200 terminations.

F. Modular patch panels are limited to 24-port and/or 48-port configurations. 96-port patch panels are not permitted.

G. Provide (1) 2U Horizontal Cable Manager for each patch panel. Horizontal cable manager shall have (5) 3.5 inch distribution rings.

H. Provide one 48-port patch panel for newly added cabling.

I. The modular patch panel shall be Underwriter's Laboratories (UL) listed, and ETL certified. All modular patch panels shall be UL listed.

J. Approved manufacturers

1. Siemon - HD6 (Category 6)
2. Ortronics - Clarity6
3. Panduit - DP6 (Category 6)
4. CommScope - UNP600 (Category 6)
5. Leviton - 69586-C48 (Category 6)

2.3 UTP PATCH CABLES AND WORK AREA CABLES

A. The same company manufacturing the connectivity shall manufacture all UTP jumper cables.

B. The Contractor shall supply a quantity of patch cables equal to 100% of the horizontal cables terminated in each TR.

C. The Contractor shall supply a quantity of work area cables equal to 75% of the horizontal cables terminated at the work area TO.

D. The contractor shall coordinate patch cord lengths and colors with Owner and Engineer prior to purchase - patching scheme to be determined and agreed upon to ensure a professional and tidy installation.

E. For installations of mixed cross connect connection points, including, but not limited to projects that utilize both 110 blocks and RJ45 patch panels, the Contractor shall provide the proportionate number of mixed patch cables as are required above.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Electrical considerations

1. All patch panels regardless of function or cabling terminated on them, shall have at least (1) paint piercing washer installed between it and the equipment rack it is installed.
2. All rack mounted devices shall be secured to the equipment racks with appropriate mounting hardware secured at all locations possible i.e. if there are locations for 4 screws - 4 shall be used.
3. Where there are shielded cables terminated in the equipment racks an additional #6 shall be provided from the grounding buss bar serving the space.

4. Conduit and electrical boxes shall not be secured to equipment racks or cabinets except where expressly identified on the drawings or field verified with the engineer and Owner.
5. The Contractor shall provide all devices for routing the cabling as indicated on the Drawings, and as required by the manufacturer of the Structured Cabling System, so as to maintain the long-term health and operability of the Structured Cabling System.

3.2 STRUCTURED CABLING SYSTEM TESTING

A. General

1. The Engineer retains the right to be present at any or all cable certification. The Contractor shall provide written notice 48 hours prior to the beginning of the certification process.
2. The Contractor shall provide a copy of the unaltered certification test reports to the Engineer in both hardcopy and electronic format. The Contractor shall also provide a copy of the associated Cable Tester's Database Management Software with unedited soft copy.
3. Independent System Certified testing may be required, at the discretion of the Engineer, provided at the expense of the Contractor, in the event of non-performance of the specified testing procedures, submittals and/or installation procedures. The extent and logistics of the independent testing shall be arranged by the Engineer.
4. The Engineer reserves the right to mandate re-termination or other reasonable rework to improve the performance of any cabling indicated as being a "marginal pass".

B. Copper Cabling

1. Upon completion of the cable installation, the Contractor shall perform complete copper cable certification tests on every cable, including but not limited to:

   a. For Category 3 Cabling and higher:

      1) Wire Map
      2) Length
      3) Attenuation
      4) Near End Cross Talk (NEXT)

   b. For Category 5 and higher, additional tests shall be:

      1) Equal Level Far End Cross Talk (ELFEXT)
      2) Propagation Delay and Delay Skew
      3) Return Loss

   c. For Category 5e and higher, additional tests shall be:

      1) Power Sum Cross Talk (PSNEXT and PSELFEXT)
      2) Insertion Loss

2. Test shall be performed to published standards, including but not limited to, the latest revisions of EIA/TIA 568, ISO/IEC 11802 and other applicable standards at the time of installation.
3. All tests shall be performed with a certified Level lle or lll UTP/ScTP test device.

4. All UTP/ScTP field tester shall be factory calibrated each calendar year by the field test equipment manufacturer as stipulated by the manuals provided with the field test unit. The calibration certificate shall be provided to the Engineer for review prior to the start of testing.
5. New test leads and/or calibration of testing instruments shall be provided at the beginning of each project.
6. Autotest settings provided in the field tester for testing the installed cabling shall be set to the default parameters.
7. Test settings from options provided in the field testers shall be compatible with the installed cable under test.
8. All proposed Category 5e channels are qualified for linear transmission performance up to 100 MHz to ensure that high frequency voltage phase and magnitude contributions do not prove cumulative or adversely affect channel performance.
9. All proposed Category 6 channels are qualified for linear transmission performance up to 250 MHz to ensure that high frequency voltage phase and magnitude contributions do not prove cumulative or adversely affect channel performance.
10. All proposed Category 6A channels are qualified for linear transmission performance up to 500 MHz to ensure that high frequency voltage phase and magnitude contributions do not prove cumulative or adversely affect channel performance.
11. Category 3, UTP/ScTP horizontal and backbone cables, whose length does not exceed 90 m (295 ft) for the permanent link, and 100 m (328 ft) for the channel shall be 100 percent tested according to the latest revisions of ANSI/TIA/EIA-568, and all appropriate addenda. Test parameters include wire map plus ScTP shield continuity (when present), attenuation, length, NEXT (Near end crosstalk loss). NEXT testing shall be done in both directions.
12. All UTP/ScTP backbone cables exceeding 90 m (295 ft) or 100 m (328 ft) shall be 100 percent tested for continuity if applications assurance is not required.
13. Category 5e or higher, UTP/ScTP horizontal and backbone cables, whose length does not exceed 90 m (295 ft) for the basic link, and 100 m (328 ft) for the channel shall be 100 percent tested according to the latest revisions of ANSI/TIA/EIA-568, and all appropriate addenda. Test parameters include wire map plus ScTP shield continuity (when present), length, NEXT loss (pair-to-pair), NEXT loss (power sum), ELFEXT loss (pair-to-pair), ELFEXT loss (power sum), return Loss, attenuation, propagation delay, and delay skew. All UTP/ScTP backbone cables exceeding 90 m (295 ft) or 100 m (328 ft) shall be 100 percent tested for continuity if applications assurance is not required.
14. Category 3 and 5e or higher category backbone cables, that exceed 90 m (295 ft) or 100 m (328 ft), but less than 800 m (2, 624 ft) or 815 m (2, 674 ft), and applications warranty is desired, shall have 100 percent of the cables tested according to ISO/IEC Class A, B, or C.

END OF SECTION

SECTION 271500 - HORIZONTAL COPPER CABLING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Horizontal Copper Cabling

1.2 SUBMITTALS

A. Submittals shall include instructions for installation and maintenance, suitable for inclusion in the Operating and Maintenance Manuals.

B. Submittals shall include descriptive literature for all cabling system components, connections, connectors and a comprehensive bill of materials. Highlight the specific part numbers/descriptive text of the materials to be provided.

1.3 PERFORMANCE AND WARRANTY

A. The Contractor shall furnish and install all system cabling and components as required for a complete system as described elsewhere in these Specifications and as shown on the Drawings.

B. The Contractor shall guarantee all material and installation labor to be free from defects for a period of one (1) year from the date of formal written acceptance by the Owner.

C. System shall carry an industry standard, performance based warranty, by the connectivity manufacturer, for a period of at least 20 years on the horizontal cabling; including patch panels, patch cables, terminations and labor. The remaining portions of the system shall be warranted for a period of one (1) year from date of substantial completion by the contractor.

1.4 RECORD DRAWINGS

A. The Contractor shall submit to the Owner as a condition of final payment and acceptance a single reproducible set of Record Drawings exactly as the System was installed with all cable numbers designated on the Drawings.

PART 2 - PRODUCTS

2.1 HORIZONTAL DISTRIBUTION CABLE

A. Category 6 UTP, 4 Pair

1. Category 6 UTP, 4 Pair Horizontal Distribution Cables shall extend between the TO and the associated HC, shall consist of 4 pair, 24 gauge, UTP, and shall terminate all conductors onto an 8 pin modular jack provided at each outlet.
2. Cable jacket shall comply with Article 800 of the NEC for use as a plenum or non-plenum cable as required by these Specifications and by the local authority having jurisdiction. The 4 pair UTP cable shall be UL Listed Type CMP (plenum) or CM (non-plenum).
3. For environments requiring CMP (plenum) rated cable, the cable jacket and the insulation of all individual conductors shall be of plenum rated materials.

4. The Category 6 UTP cable shall be a round cable design with fluting to maintain the appropriate pair spacing relationship. The cable shall support all current future applications designed to run on Category 6 cabling. Use of a bonded pair cable is expressly prohibited.
5. The Category 6 cable shall be specified to a minimum of 250 MHz.
6. Approved manufacturers

    a. CommScope - CS34
    b. BerkTek - LanMark 1000
    c. Mohawk - AdvanceNet
    d. General - GenSPEED 6000
    e. Superior/Essex - DataGain Category 6+
    f. CommScope - CS37
    g. BerkTek - LanMark 2000
    h. Mohawk - GigaLAN Category 6+
    i. General - GenSPEED 6500
    j. Superior/Essex - NextGain Category 6eX

B. UTP Patch cables and work area cables

1. The same company manufacturing the connectors supplied for the horizontal connectivity shall manufacture all UTP jumper cables.
2. The Contractor shall supply a quantity of work area cables equal to 75% of the horizontal cables terminated at the work area TO.
3. Both patch cables and work area cables shall be divided evenly at 50% (1) meter, and 50% (3) meter, unless otherwise noted.
4. For installations of mixed cross connect connection points, including, but not limited to, projects that utilize both 110 blocks and RJ45 patch panels, the Contractor shall provide the proportionate number of mixed patch cables as are required above.
5. The Contractor shall supply a quantity of patch cables equal to 100% of the horizontal cables terminated in each TR.
6. Patch-cords shall be standard diameter.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Protection

1. It is the responsibility of the contractor to protect the cabling from the time it is installed up until the point of turnover to the owner. Cabling that is damaged as a result of construction activities by any means shall be replaced by the contractor at no cost to the Owner. Cabling that cannot be warrantied shall be replaced at no cost to the owner.

B. Cable Type

1. Cable jacket shall comply with Article 800 of the NEC for use as a plenum or non-plenum cable as required by these Specifications and by the local authority having jurisdiction. The 4 pair UTP cable shall be UL Listed Type CMP (plenum) or CM (non-plenum).
2. Cables shall be rated for the environment in which they are installed. Cables in underground conduits shall be rated or wet environments. Where this occurs and the wire will be exposed for 50 feet or more before termination, the wire shall be transitioned on 110 style block.

C. Testing Results

1. Testing results shall be provided to the owner and engineer as called for in these documents. Cabling that does not pass testing shall be initially troubleshot by the contractor and corrected.
2. All cabling that does not pass testing and cannot be corrected by the contractor shall be replaced at no cost to the Owner.
3. Testing results shall be provided prior to closeout documentation in submittal form for review and/or corrective action.

END OF SECTION

SECTION 277500 – INTRUSION DETECTION SYSTEM - IDS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. An expansion to the existing DSC Intrusion Detection System (IDS).

B. Interfaces to other equipment:

1. Fire Alarm System
2. Building automation system

1.2 RELATED WORK ELSEWHERE

A. Electrical specifications sections

B. Technology General Provisions

C. Cabling system Administration

D. Structured Cabling System

1.3 DESCRIPTION OF WORK

A. Provide additional motion detectors and door monitoring points/door contacts onto the existing Intrusion Detection System (IDS) as shown on the Drawings and specified herein.

B. Unless specifically noted as "By Others" the Security Contractor, hereafter SC or contractor, shall provide:

1. All hardware and cabling, including but not limited to:

a. Door Position Sensors / switches.
b. Motion Detectors.
c. Installation labor, technical labor, and certified labor.
d. Any other item needed to accomplish the intent of this Specification and the Contract Drawings, as required for a complete and operational System.

1.4 SUBMITTALS

A. Refer to Sections 270100 and 270101 for additional requirements.

B. Submit product data for all manufactured items listed in paragraph 1.1 WORK INCLUDES.

C. In addition to the items defined above, the following shall be provided:

1. Complete and comprehensive Equipment Catalog Specification Sheets of each component provided. Organize the submittals according to the order laid out under Part 2 of this Specification and provide a title page which identifies the Specification Section being met by each item.

1.5 CONSTRUCTION DOCUMENTATION

A. Refer to Section 270101 for detailed requirements.

1.6 QUALITY ASSURANCE

A. The system shall meet all requirements and operate in accordance with manufacturers published representations.

B. The supplied hardware shall be full compatible so that devices may be integrated into system without requiring replacement of hardware or software packages.

C. The IDS devices shall be UL Listed in accordance with its intended function. The system shall meet the requirements of the NEC, NFPA, ASME/ANSI and all State and Local Codes. All system components shall be UL Listed under one of the following standards:

1. Underwriters' Laboratories, Inc. (UL) equipment standards, Latest Edition

   a. UL 1610 - The Standard of Safety for Central Station Alarm Units
   b. UL 639 - The Standard of Safety for Intrusion Detection Units
   c. UL 609 - The Standard of Safety for Local Burglar Alarm Units and Systems

2. All material and equipment shall be listed, labeled, or certified by Underwriters Laboratories, Inc. All power supplies and computers shall be UL Listed. Any system device that does not have the required UL Listings at time of bid may be rejected.

D. The system controls shall be UL Listed for Power Limited Applications.

E. The SC shall determine the exact nature of the environment for the installation of all environmentally sensitive pieces of equipment, and substitute materials and devices consistent to the environment to which they are to be installed. Where devices being substituted are not already defined within these Specifications, the SC shall submit the necessary cut sheets and product data for the Engineer to provide the necessary approvals prior to installation and rough-in. Any substitution required due to environmental, or field conditions shall be made at no additional cost to the Owner.

F. All items or manufacturers specified for peripheral devices are subject to compatibility with IDS system. SC shall submit current and compatible products based upon existing IDS system.

G. As part of their proposal the SC shall identify, in writing, any areas where the specification cannot be met and list verifiable reasons. The SC, in conjunction with the Manufacturer, shall recommend an alternative that can meet or approach the intended performance as specified. By providing a bid the SC is confirming that the system can be provided as specified except where SC identifies in the written response.

H. At any time before or after issuance of contract, and upon request, the SC shall be responsible for providing the Owner or Engineer written documentation supporting the SC compliance with any requirement in this specification.

I. Contractor Experience

1. The onsite foreman shall have completed projects of similar size and scope within the last two years. References shall be made available for review and approval.
2. SC shall provide evidence of previous successful experience in the design, supply, installation and start-up of like kind and scope Integrated Security Management Systems.

1.7 WARRANTY

A. The Security Contractor shall warrant all components for a period of one (1) year after the date of final acceptance by the Owner. The warranty shall cover the replacement of all supplied components, including labor required, that fails or do not comply with performance specifications.

B. Response time shall be 2 hours for major failures and 24 hours for minor failures. A major failure shall be defined as a malfunction resulting in the loss of two or more secured doors.

PART 2 - PRODUCTS

2.1 GENERAL

A. The existing DSC IDS provides local operational control of all intrusion points and alarm sensors using a simple and easy-to-use graphical user interface.

2.2 HARDWARE - GENERAL

A. Power - All system power supplies shall be centrally located in the Technology Rooms and connected to the Technology Room generator powered, UPS units.

B. Secondary power - All IDS and PACS Control Panels and Door Power Supplies have an integral battery charging system and battery(s). Backup time shall be a minimum of 4 hours.

C. Physical security of equipment

1. Enclosures shall be locked and electronically monitored.
2. All locks shall be keyed alike to a single key for the entire system.
3. Exterior devices shall use tamper resistant screws. The SC shall provide (2) of each style of driver required to remove the tamper resistant hardware.

2.3 DEVICES

A. Motion Detectors / Sensors

1. General

a. The sensors shall be microprocessor controlled and contain a false alarm protection feature with immunity to drafts, insects, and small animals.
b. The sensors shall be capable of mounting either on a ceiling, wall surface or in a corner. Include any mounting plates, gimbal mounts, or adapters required for mounting and aiming.

2. Tamper Resistance

3. Detectors shall have an integral tamper switch to alert system to removal of cover.

4. Detectors shall have anti-masking alert capability.
5. Approved Manufacturer

    a. Bosch
    b. OPTEX
    c. Honeywell

B. Door Position Sensor (DPS)

1. General

    a. The DPS shall provide an open or closed indication for all doors monitored or controlled on the IDS.

2. Specific Requirements

    a. Unless otherwise noted the sensors shall be flush mounted, round, magnetic, 0.75".
    b. Sensors for roll up or overhead doors shall be surface mounted, armored cabled and designed as "wide gap devices" with the ability to operate at a maximum distance of up to 2" (5 cm).
    c. DPS for doors which must be monitored by the PACS and IDS, shall be double pole double throw (DPDT). Both sets of contacts shall monitor door position, but one set of contacts shall report to the PACS and the other to the PACS.
    d. Bond sensors on electromagnetic locks shall not be used as a DPS.

3. Color

    a. Color shall be white on all aluminum frames.
    b. Color shall be brown for all painted steel frames and wood frames.

4. Approved manufacturers:

    a. Amesco/Potter
    b. Ademco
    c. GE- Sentrol

2.4 WIRING

A. All doors shall have either individual conductors for each device indicated on the drawings or details or a composite cable inclusive of the required conductors brought to each door for the devices indicated on the drawings and details. Cables to be provided as needed per door to be pulled into a junction box above each door – cabling per device shall have the following minimum components / requirements:

1. Motion Detectors

    a. (1) #22/4

2. Door Position Switch

    a. (1) #22/2 or #22/4 preferred

3. All cabling shall be rated for the environment for which it is installed. Cabling transitions shall be provided where required.
4. Acceptable Manufacturers

    a. Windy City Wire
    b. Belden
    c. West Penn Wire

PART 3 - EXECUTION

3.1 CONFIGURATION

A. IDS

1. Program system configuration parameters including hardware, software, zone/circuit numbers, communication parameters, and any other programming required to meet the operational requirements of the Contract Documents.
2. Program operational parameters such as opening/closing reports and windows, system response text (custom English) displays of events, activation of relays that drive auxiliary devices, and identifying types of zones/loops.
3. Program the added Intrusion Zone Labels, Point ID labels, and device configuration in the Control Panel, the head end database.
4. The Contractor shall confirm IDS zoning of the facility in a logical fashion in accordance with schedules and uses of those areas, as well as the logical location of arm / disarm keypads. There may be instances where the owner may wish to utilize portions of the facility while arming other areas.

END OF SECTION

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 WORD INCLUDES

A. Contact the Ohio Utility Protection Services (811) and utility companies at least 48 hours prior to any site clearing / excavating operations.

B. Locate, identify, verify, and protect existing trees and vegetation to remain based on owners direction.

C. Protect benchmarks, survey control points, and ex. site improvements to remain from damage or displacement. All damaged or disturbed benchmarks, survey control points or property pins shall be replaced by a Professional Surveyor registered in the State of Ohio.

D. Contractors shall remain within property lines, lease lines, easement areas, designated perimeter limits, or limits of work areas shown on drawing.

E. Clearing and grubbing. Include complete removal of any remaining stumps & vegetation. Protect plants, trees, vegetation noted to remain.

F. Topsoil stripping. Apply herbicide to areas to be paved after stripping topsoil.

G. Removal of above-grade site improvements and removal of any below grade improvements (ex. utilities, building foundations, etc. as applicable in order to install improvements shown on Contract Drawings.

H. Locate, identify, and mark utilities within site boundaries to remain or be removed. Protect utilities to remain. Disconnect, cap, or seal and abandon site utilities in place per utility co. requirements. If noted on plans backfill pipes to be abandoned in place with grout or LSM. Notify engineer immediately if unknown utilities or utility connections are encountered.

I. Identify and accurately locate capped utilities and other subsurface structural, electrical, technological, and mechanical conditions, as applicable. Note utility locations on contractor's as-built mark-up plans and submit copy to engineer. Coordinate clearing work and comply with all utility company requirements before starting work.

J. Backfill any excavated areas with compacted fill suitable for the area. Refer to the backfill specifications and geotechnical report (if applicable) for additional information.

K. Provide and maintain temporary soil erosion and sedimentation control measures per the project's SWPPP & specifications.

L. Remove debris from site. Leave site in clean condition ready for earthwork.

M. Make new openings in curbs and gutters neat, as close as possible to profiles indicated and only to extent necessary for new work.

N. At concrete, paving, and other materials where edges of cuts remain exposed in the complete work, make cuts using power-saving equipment. Do not overcut at corners of cut openings.

O. Contractor shall delineate limits of pavement removal in the field, neatly saw cut pavement at limits, remove and dispose off-site the existing pavement. Pavement removal shall include all base and subbase aggregate material.

1.2 DEFINITIONS

A. "Topsoil": natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shades of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, and other objects more than 1-1/2 inches in diameter; and free of weeds, roots, and other deleterious materials.

B. Caliper: Instrument used to measure tree diameter.

C. Clearing: Removal and disposal of above-ground featured items defined herein.

D. Grubbing: Removal and disposal of below-ground items defined herein.

E. Salvage: Shall include, but not limited to such as items as castings, piping, brick, steel, iron, copper, brass, aluminum and other metals, wiring, conduits, lighting, signs, etc.

1.3 MATERIALS OWNERSHIP

A. Except for materials indicated to be stockpiled, salvaged, or to remain on OWNER'S property, cleared materials shall become CONTRACTOR'S property and shall be removed from the site.

B. The ARCHITECT / ENGINEER will direct the CONTRACTOR whether and/or where to store excess stripped topsoil on the property.

C. If materials are determined to be salvageable and are not shown on the plans to be salvaged, the contractor shall notify the ARCHITECT / ENGINEER in writing via email and temporarily store items for them to make a claim. If after one week of notification the contractor is responsible for dispose of them.

1.4 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings/log of site clearing items.

C. Site Clearing Plan; Submit schedule and methods for accomplishment of temporary and permanent erosion control work as applicable for clearing and grubbing, grading operations, borrow pits and haul roads; a plan for disposal of waste materials; and a schedule of operation at locations of high siltation potential in sufficient detail to clearly indicate how siltation of streams, lakes and reservoirs and the interruption of normal stream flows will be held to a practical minimum.

1.5 QUALITY ASSURANCE

A. Pre-installation conference: conduct conference at project site

1.6 PROJECT CONDITIONS

A. "Traffic": minimize interference with adjoining roads, streets, parking lots, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from OWNER and authorities having jurisdiction (AHJ).
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction (AHJ)

B. "Improvements on adjoining property": authority for performing indicated removal and alteration work on property adjoining OWNER'S property will be obtained by OWNER before award of contract.

C. "Salvageable improvements": carefully remove items indicated to be salvaged and store on OWNER'S premises where indicated, or alternate location where applicable.

D. Existing facilities, structures, and utilities are shown in accordance with available field survey data and record drawings. The indicated locations of trees, underground utilities and structures are approximate. Other trees and utilities may exist which are not indicated. CONTRACTOR shall notify utility locater service before site clearing in accordance with State Revised Code "Protecting underground utility facilities during construction of public improvement".

E. The Contractor shall employ a qualified utility locating service for all underground utilities outside the public R/W.

PART 2 – NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction. Replace if damaged to satisfaction of the OWNER and ENGINEER.

B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, roadways, and drives. Install items per the Storm Water Pollution Prevention Plan.

C. Locate and clearly flag trees and vegetation to remain or to be relocated. Refer to SWPPP plans for additional information.

D. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to OWNER.

E. Comply with seasonal and permitting restrictions on when the Contractor may perform the clearing and grubbing operations.

3.2 TREE PROTECTION & REMOVAL

A. Tree removal is prohibited between April 1st and September 30th due to federally endangered Indiana Bat and Northern Long-Eared Bat which may have roosting habitats in the project area. All tree cutting work must be completed before the April 1st deadline and may not begin until after October 1st.

B. Remove all trees indicated on the Contract Documents to be removed, and their major roots existing within the area of new pavements and structures.

C. Areas designated to receive pavement or structures shall be grubbed a depth of 18-inches. Measure cut from existing ground surface or proposed ground surface.

D. Apply herbicide to remaining roots and vegetation to inhibit growth.

E. Depressions made by grubbing shall be filled with suitable material and compacted to conform to the original adjacent grades.

F. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.

1. Do not store construction materials, debris, excavated material, or material stockpiling within drip line of remaining trees.
2. Do not permit vehicles, equipment, stored materials, temporary facilities, or foot traffic within drip line of remaining trees.

G. Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with the following:

1. All embankments, except rock embankments, shall be constructed using moisture and density control. All subgrade, except rock and shale in cut sections, shall be constructed using moisture control and density control.

H. Do not excavate within drip line of trees, unless otherwise indicated.

I. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly to prevent roots from dying out. Backfill with soil promptly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches in diameter with emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
4. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction in a manner approved by the Landscape Architect.
5. Use only hand methods for grubbing within drip line of remaining trees.

J. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by the ARCHITECT, ENGINEER or OWNER.

1. Employ a qualified Arborist, licensed in jurisdiction where project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified Arborist.

K. Protection of trees and shrubs scheduled to remain shall be assigned to the general CONTRACTOR and shall include tops, trunks and roots. Temporary tree protection fences are required because of proximity to the work. Tree protective fencing should be 6’ high chain link (2" mesh) or safety orange mesh fencing. Any pruning required shall be with the approval and direction of the Landscape Architect. The general CONTRACTOR shall be responsible for the survival of protected trees for one (1) year after the construction project is substantially completed.

L. Low hanging branches and unsound or unsightly branches on trees or shrubs within the project area which are designated to remain shall be removed as directed. Branches of trees extending over the roadbed shall be trimmed to give a clear height of 20 feet above the pavement surface or as directed by the ARCHITECT and ENGINEER.

3.3 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
2. Arrange to shut off affected utilities with utility companies.

B. Existing utilities: do not interrupt utilities serving facilities occupied by OWNER or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify ARCHITECT, City and utility owner and ENGINEER in writing not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without ARCHITECT, utility owner or City's and ENGINEER'S written permission.
3. The CONTRACTOR is to indicate in construction schedule any known utility interruption.

C. Excavate for and remove underground utilities indicated to be removed. Include capping/plugging abandon ends of pipes and backfilling pipes/conduits that are to be abandoned in place with low strength mortar or grout.

3.4 CLEARING, GRUBBING AND TOPSOIL REMOVAL

A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions, and grubbing roots. Strip all objectionable growth. Remove from the site all debris resulting from the stripping operations at frequent intervals to prevent accumulation of material. On-site disposal of material is not permitted.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or relocated.
2. Completely remove stumps, roots, obstructions, and debris extending to a depth of 24 inches below exposed & final subgrade. Do not dispose of on-site.

B. In a time defined prior to the start of construction, fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

C. Place fill material in horizontal layers not exceeding 8-inch loose depth and compact each layer in accordance with requirements for engineered fill.

3.5 TOPSOIL STRIPPING

A. Strip topsoil to its full depth from entire area to be graded. Stockpile where directed by OWNER and where it will not interfere with construction activities. Install silt fence and/or silt sock round stockpile area. Topsoil to be reused shall be free from roots, brush and debris. Excess topsoil shall be deposited and/or spread on property as directed by the ARCHITECT/ENGINEER. Refer to Geotechnical report if available, and landscape drawings if available, and specifications for additional information.

B. If stockpiling on-site, remove sod and grass before stripping topsoil.

C. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.

D. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water away. Cover stockpiles to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches.
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Install and maintain silt fence around any topsoil stockpiles.

3.6 EXISTING SITE IMPROVEMENTS

A. Remove existing above-and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, buildings, foundations, utilities, and aggregate base as applicable.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Neatly saw-cut faces vertically.
2. If noted on the drawings address existing wells and septic systems abandonment and/or removal per local Health Department Requirements and Standards.
3. Wet down during the demolition operations to prevent dust from arising. Minimize spread of dust and airborne particles.
4. Raze, remove and dispose of all buildings and foundations, structures, fences, guardrails, old pavement, abandoned pipe lines, storage tanks, septic tanks, vaults and other obstructions any portions of which are within the limits of the project, except utilities and those items for which other provisions have been made for removal. All designated salvageable material shall be removed, without unnecessary damage in sections or pieces which may readily be transported and shall be stored and protected by the CONTRACTOR at specified places within the project limits.
5. Building demolition shall be performed per the Architect plans and specifications for building removal.

C. Underground Storage Tanks

1. Existing underground storage tanks encountered shall be removed by a certified UST removal contractor and reported to the state. If encountered on the project, contact an Environmental Engineer for further direction.

3.7 DISPOSAL

A. "Disposal": remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off-site at a State certified construction debris or hazardous waste landfill.

1. Do not burn or bury removed materials on project site.

2. If hazardous materials are encountered during clearing operations, notify the ENGINEER for additional instructions. Comply with laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.
3. In order to retard and prevent the spread of destructive insects limit the movement of regulated articles according to state Law.
4. Observe requirements for handling and transporting of regulated articles in quarantined areas as defined by state requirements.
5. Follow all federal and state requirements for quarantines and regulated articles.

END OF SECTION 31 10 00

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

A. For this project a Geotechnical Study and Report was provided by Wertz Geotechnical dated July 15, 2021 and is included as part of the bid package. The Geotechnical Report governs where any conflict occurs between this section and the recommendations in the report.

1.1 WORK INCLUDES

A. Preparing sub grades for slabs-on-grade, walks, pavements, lawns, and plantings.

B. Aggregate base course for asphalt paving.

C. Subsurface drainage backfill for walls and trenches.

D. Engineered fill.

E. Base bids on excavating and filling with materials encountered at site except where special fill or backfill materials are specified herein or indicated on Drawings. No allowance or extra payments will be made by reason of variations in types of soil encountered or variations in their moisture contents. Furnish additional fill material required and included as a part of the work. Include removal of excess or objectionable materials as part of the work.

1.2 DEFINITIONS

A. Backfill: soil materials used to fill an excavation.

1. Initial Backfill: backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Final Backfill: backfill placed over initial backfill to fill an excavated area to final grade.

B. Base Course: layer placed between the sub-base course and asphalt paving.

C. Sub-base course: layer placed over the excavated sub-grade in a trench before laying pipe. Layer placed between the sub-grade and base course for asphalt paving, or layer placed between the sub-grade and a concrete pavement or walk.

D. Sub-grade: surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below sub-base, drainage fill, or topsoil materials.

E. Borrow Soils: satisfactory soil imported from off-site for use as fill or backfill as approved by the Geotechnical Engineer.

F. Drainage Course: layer supporting slab-on-grade used to minimize capillary flow of pore water.

G. Excavation: removal of material encountered above sub-grade elevations.

1. Additional Excavation: excavation below subgrade elevations as recommended by the testing agency and approved by the OWNER/ENGINEER to reach specified compaction level. Additional excavation, replacement, and proof-roll unit costs are to be included in the base contract amount.

2. Bulk Excavation: excavations more than 10 feet in width and pits more than 30 feet in either length or width.

3. Unauthorized Excavation: excavation below sub-grade elevations or beyond indicated dimensions without direction by the testing agency and approved and directed by the OWNER/ENGINEER. Unauthorized excavation, as well as remedial work recommended by the testing agency and approved and directed by the OWNER/ENGINEER, shall be without additional compensation.

H. Fill Soils: suitable soil materials, as determined by the testing agency geotechnical engineer and the OWNER/ENGINEER, used to raise existing grades.

I. Shale: Laminated material, formed by the consolidation in nature of soil, having a finely stratified structure. For the purpose of these Specifications, the following bedrock types shall also be considered as shale: mudstone, claystone, siltstone and clay bedrock.

J. Rock: rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material exceeding 1 C.Y. for bulk excavation or 3/4 C.Y. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment, without systematic drilling, ram hammering, ripping, or blasting, when permitted.

K. Structures: buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

L. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings, as applicable.

M. Optimum Moisture: The water content at which the maximum density is produced in a soil as determined ASTM D698 (Standard Proctor), or field test strip.

N. Field Testing: Testing of fill and subgrade compaction shall be as directed by the OWNER/ENGINEER and performed by the testing agency.

O. Laboratory Dry Weight: The maximum laboratory dry weight shall be the weight provided by the Laboratory when the sample is tested in accordance with ASTM

D698.

1.3 SUBMITTALS

A. Product data for the following:

1. Notify and provide data to regulatory authorities and OWNER/ENGINEER prior to commencement of work.

2. Provide notice of: encounter with unknown utilities; subgrades before filling; areas requiring testing or inspection.

3. Materials Sources: Name of fill material source, location, date of sample, sieve analysis, and laboratory compaction characteristics.

4. Disposal Locations: Name and location of final destination for all materials hauled off site.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D2487 of each on site and borrow soil material proposed for fill and backfill.

2. Current laboratory compaction curve according to ASTM D698 for each on site and borrow soil material proposed for fill and backfill.

3. Field reports; in-place soil density tests.

4. One optimum moisture – maximum density curve for each type of soil encountered.

5. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

6. Test reports must be submitted daily to the Architect and Owner.

7. Water Content

C. Samples: for the following (if indicated by X below):

1. _X_30-lb samples sealed in airtight containers, of each proposed soil material from on-site or borrow sources and engineered fill materials delivered to geotechnical testing agency for running proctor tests. Document borrow material source(s) for each sample submitted. Documentation shall include name of source, location, date of sample, sieve & grain size analysis, soil characteristics, unit weight, and Std. Proctor laboratory compaction results at designated optimum moisture content.

1.4 QUALITY ASSURANCE & REPORTS

A. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO).

2. American Society for Testing and Materials (ASTM).

3. Ohio State Department of Transportation "Construction Materials Specifications", 2019 or current edition.

B. "Codes and Standards" - perform earthwork complying with requirements of authorities having jurisdiction.

C. Tolerances: As indicated herein.

D. "Geotechnical Testing Agency Qualifications" - an independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

E. Soil testing service: The OWNER will engage a qualified independent testing agency to perform material evaluation tests for all geotechnical work specified herein. The testing agency shall provide the OWNER/ENGINEER a letter certifying soil material used and compaction results. All requested extra work and/or change orders based on existing soil conditions or tests of soils that do not meet the project specifications shall be approved and directed by the OWNER/ENGINEER.

F. Testing: Requirements as specified herein.

G. The testing agency shall provide results from field density testing during construction to OWNER/ENGINEER. Note material sampled and characteristics of soil. CONTRACTOR is to be advised immediately of tests failing to meet specifications. CONTRACTOR is solely responsible to correct deficiencies and to supply test and proof rolling results to Engineer in order to confirm suitability.

1.5 PROJECT CONDITIONS

A. Subsurface Conditions: Subsurface soils investigations have been made at the site.

B. Existing Utilities: do not interrupt utilities serving facilities occupied by OWNER others unless permitted in writing by OWNER/ENGINEER, and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify OWNER/ENGINEER not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without OWNER/ENGINEER written permission.

3. The utilities protection service does not locate utilities outside public R/W's. The CONTRACTOR shall employ a qualified utility locating service for all underground utilities on the project.

4. Cut and cap, demolish, and completely remove from site existing underground utilities indicated to be removed in accordance with both City and utility provider requirements. Coordinate with utility companies to shut off services if lines are active. The Engineer may, with written approval, allow abandoned utilities greater or equal to 6" diameter, located under parking or buildings, to be completely filled with non-shrink grout or LSM.

5. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult Utility OWNER/ENGINEER immediately for directions. Cooperate with OWNER/ENGINEER and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the Utility OWNER/ENGINEER and the utility owner representative.

1.6 PROTECTION

A. Safety: Provide protective measures necessary for the safety of workmen, to the public and adjacent property. Prevent cave-ins, collapse of walls, structures, and slopes, both on and adjacent to the site.

B. Standards: Comply with regulations of local authorities having jurisdiction, including all applicable O.S.H.A. requirements.

C. Repair: Includes the removal and replacement with new materials affected by settlement.

1.7 ENVIRONMENTAL CONDITIONS:

A. Do not apply soil treatment when temperature is at or below freezing or when ground is frozen or frost is expected.

B. Do not apply soil treatment when surface water is present.

1.8 EXISTING CONDITIONS:

A. Accept the site in the condition which it exists at the time of the award of the contract and perform all work to the grades indicated.

B. Protect plant material, lawns and other features not designated for removal.

C. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soil Materials:

1. Complying with American Association of State Highway and Transportation Officials (AASHTO) M145, soil classification Groups A-1, A-2-4, A-2-5, and A-3. Soil classification Group A-6 may be satisfactory if approved by the testing laboratory.

2. Complying with ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, AND SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. CL can be used if approved by the geotechnical testing agency engineer and approved by the OWNER.

3. Compacted fill and backfill shall be free of deleterious matter such as frozen materials, organics, wood, debris, or rock larger than 4 inches.

4. All material shall have a liquid limit and plasticity index not exceeding 40 and 15 respectively when tested in accordance with ASTM D-4318.

5. The minimum dry unit weight shall not be less than 110 PCF maximum dry density as determined by ASTM D-1557 (Modified Proctor).

6. All fill and backfill materials shall be obtained from on site or from off-site sources and shall be approved by the Geotechnical Engineer prior to placement.

7. Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

C. Unsatisfactory Soils:

1. ASTM D 2487 soil classification groups GC, SC, MH, CH, OL, OH, and PT, or a combination of these group symbols.

2. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

3. Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-6, A-2-7. A-4, A-5, and A-7; also, peat and other highly organic soils. Material that fails to meet requirements for suitable materials; or contains any of the

following:

a. Organic clay, organic silt, or peat; as defined in ASTM D2487.

b. Vegetation, wood, roots, leaves, or organic, degradable material.

c. Stones or rock fragments over six inches in any dimension.

d. Porous biodegradable matter, excavated pavement, construction debris, rubbish, or refuse.

e. Ice, snow, frost, or frozen soil particles.

f. Slag.

D. General Fill: Suitable, unclassified soils.

E. Structural Fill: Suitable material that is classified by the Unified Soil Classification System (USCS) in accordance with ASTM D2487 as GW, GP, GM, SW, SP, SM, or if approved CL. Verify that the largest particles in the fill are no greater in dimension than one-half the thickness of the compacted lift thickness.

1. Representative samples of the proposed fill materials should be collected at least one week prior to the start of the filling operations. The samples should be tested to determine the maximum dry density, optimum moisture content, particle size distribution and plasticity characteristics. These tests are needed to determine if the material is acceptable as structural fill and for quality control during the compaction process.

2. All on site material that is stockpiled and designated to be used as Structural Fill shall be field tested and evaluated by the testing agency Geotechnical Engineer to determine if it meets the requirements ODOT and the additional requirements as set forth in this section. Written acceptance from the testing agency and owner shall be obtained prior to be accepted as Structural Fill.

3. The fill should be placed in layers of not more than 8 inches in thickness, with each layer being compacted to a minimum density of 100 percent of the maximum dry density and within ± 2% of the optimum moisture content, as determined by the Standard Proctor Method ASTM D-698. Moisture control (increasing or decreasing the natural moisture content) of the engineered fill materials may be necessary for compaction.

4. Rock, shale and boulders is prohibited from being used as structural fill and shall be hauled and disposed of offsite.

5. Silt shall not be used as fill in new pavement or building areas.

6. The Structural Fill shall not be in a frozen condition during placement and should not

be placed on a frozen subgrade.

F. Granular Engineered Fill: naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a no. 200 sieve.

1. Engineered fill materials should consist of non-expansive materials. Pyritic and/or potentially expansive materials, such as mine tailings and slag should not be used as engineered fill material. Materials selected for use as engineered fill shall be properly moisture conditioned, inorganic and free of organic matter, cobbles, boulders, waste construction debris, or other deleterious materials.

2. Fill materials shall have a Standard Proctor maximum dry density greater than 110 pounds per cubic foot (pcf), an Atterberg Liquid Limit less than 40, a Plasticity Index of less than 15, organic content less than 1% and a maximum particle size of 2 inches or less.

G. Drainage fill:

1. Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel, (ASTM D 448 Coarse - aggregate grading size 57), with 100% passing of 1-1/2" sieve and not more than 5% passing a No. 8 sieve. Aggregate shall meet MSHA specification for No. 6 aggregate. Provide by CONTRACTOR from off- site source.

2. Aggregates used for subsurface storm water storage, underdrains, or storm sewer backfill shall be washed limestone, washed gravel, or river rock. The aggregates shall be 100 percent crushed in all cases.

H. Backflow at Below Grade Walls

1. Provide a 24” wide zone of free draining gravel behind all below grade.

I. Pavement Backfill:

1. Base: material shall comply with the requirements of ODOT Section 304 Aggregate Base Course.

2. Sub Grade Preparation: material shall comply with the requirements of ODOT Section 203 and Section 204, Aggregate Base.

J. Backfill for Utilities:

1. See Section 31 23 33 Trenching and Backfill

K. Filter Material: narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading size 67; with 100 percent passing a 1- inch sieve and 0 to 5 percent passing a no. 4 sieve.

L. Impervious Fill:

1. Where noted on plans): clayey gravel and sand mixture capable of compacting to a dense state at optimum moisture content. In special instances the Engineer may recommend the use of bentonite clay or an impervious (EDPM or approved equal) material. Special instances are not included in base bid.

M. Top Soil:

1. Clean natural topsoil free of vegetation, debris and other deleterious matter, and approved by OWNER/ARCHITECT or ENGINEER Representative. Upper 6 inches of topsoil stripped may be used, if suitable, otherwise use imported, screened, loose, fertile, friable, free of grass, brush, roots and rocks > 1-1/2" diameter, loamy soil possessing characteristics representative of productive growing soils in the area.

N. Drainage Fabric, Separation Fabric, Erosion Control Blankets and Erosion Control Fiber Mesh

1. See Section 31 32 19 Geotextile Fabric PART 3

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify existing ground surfaces have been stripped of topsoil, root mat and existing pavement, unsatisfactory soils, concrete spoil, obstructions and deleterious material.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

C. Protect sub-grades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

D. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways, and roadways.

E. Protect trees, shrubs, lawns, rock out-croppings, and other features remaining as a portion of final landscaping.

F. Protect benchmarks/project control, existing structures, fences, sidewalks, paving, and curbs from equipment and vehicular traffic.

G. Protect above and below grade utilities which are to remain.

H. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation. Monitor shoring system and surrounding ground surface during construction to detect movement. If movement becomes significant, take contingency steps to brace excavation and adjacent utility lines.

I. Notify OWNER/ARCHITECT or ENGINEER Representative of unexpected subsurface conditions and discontinue work in affected area until notified to resume work.

J. Grade excavation top perimeter to prevent surface water run-off into excavation.

K. Material cut or excavated from building areas which is suitable for backfilling may be stored on site to be distributed later.

L. Remove unsuitable and/ or excess material from site immediately.

M. Establish extent of excavation by area and elevation; designate and identify datum elevation.

N. Set required lines and levels.

O. Maintain bench marks, project control monuments, and other reference points. Relocate if necessary and reference all benchmarks to remain so that it can be reestablished if disturbed.

P. Before starting excavation, establish location and extent of underground utilities occurring in work area.

Q. Notify utility companies to remove and relocate lines which are in way of excavation. Maintain, reroute or extend as required, existing utility lines to remain which pass through work area.

R. Protect utility services uncovered by excavation.

S. Upon discovery of unknown utility or concealed condition, discontinue affected work and notify OWNER/ ENGINEER representative immediately.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared sub-grades, and from flooding project site and surrounding area. Unsuitable soils as a result of improper dewatering are to be removed and replaced at the General CONTRACTOR's expense.

B. Protect sub-grades from softening, undermining, washout, and damage by rain or water accumulation. Unsuitable soils as a result of improper sub-grade protection are to be

removed and replaced at the CONTRACTOR's expense.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system or drainage trench, when necessary to keep sub- grades dry and convey ground water away from excavations in accordance with the recommendations of the geotechnical report. Maintain system until dewatering is no longer required.

3. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding Project site and surrounding area.

4. Do not allow water to accumulate in excavations.

5. If presence of subsurface water is encountered during excavation, provide interior drainage.

6. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.

7. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas.

3.3 EXPLOSIVES

A. The use of explosives is prohibited.

3.4 EXCAVATION, GENERAL

A. Unclassified excavation: excavation to, and beyond, sub-grade elevations as necessary to reach specified compaction level, regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions. Unclassified excavated material may include rock, soil materials, and obstructions. Changes in the contract sum or the contract time will be authorized in writing by the OWNER/ENGINEER for excavation or removal of unclassified material.

B. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials as directed and approved by testing agency geotechnical engineer and the OWNER/ENGINEER.

C. Replacement of soils shall be included in both the contract time and contract sum. No adjustments shall be authorized to either component for such occurrences.

D. Verify areas to be backfilled are free of debris, snow, ice or water, and ground surfaces are not frozen.

A. Proof roll exposed subgrade in building and paving areas with 20 cu. yd. (min.) fully loaded dump truck or similar acceptable construction equipment, to detect unsuitable soil conditions. Commence proof rolling operations after a suitable period of dry weather to avoid degrading acceptable subgrade surfaces. Make 8 passes over each section with proof rolling equipment, with the last 4 passes perpendicular to the first 4 passes. Testing agency geotechnical engineer and the representative must be present for proof roll.

E. Cut out soft areas of subgrade not readily capable of in-situ compaction. Backfill and compact to density equal to requirements for suitable backfill material. Refer to Section 2.0.

F. Site backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces.

G. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of materials excavated.

1. Maintain sides and slopes of excavations in safe conditions until completion of backfilling.

H. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch.

B. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for footings and foundations: do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other

work.

2. Excavation for underground tanks, basins, and mechanical or electrical utility structures: excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended for bearing surface. Extend excavation sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

3. Refer to geotechnical report for additional recommendations.

4. Locate and mark existing underground utilities and services before beginning structural excavation.

5. Provide excavation for structures and footings, as required for construction, bracing and removal of forms, applying waterproofing, and to permit inspection.

6. Machine slope banks to angle of repose or less until shored. Do not allow excavation to interfere with normal 45 degrees angle bearing splay of any foundation.

7. Ensure bottom of excavation is reasonably level.

8. Maintain excavations in as near their natural moisture conditions as possible.

9. Fill over-excavated areas under structure bearing surfaces in accordance with testing agency geotechnical engineer direction.

10. Do not allow construction equipment to create “pumping” of soils.

11. Remove boulders or cobbles.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

B. Where rock or concrete spoil is encountered, carry excavation 18" below subgrade and backfill with suitable material approved by the testing agency geotechnical engineer and the OWNER/ENGINEER.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. See Section 31 23 23 Trenching and Backfill.

3.8 APPROVAL OF SUB-GRADE

B. Notify testing agency when excavations have reached required sub-grade.

C. If testing agency determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed with written approval of testing agency geotechnical engineer and the OWNER.

1. Additional excavation and replacement material included in the CONTRACTOR's sum will be addressed either by unit price or allowance.

D. Proof roll sub-grade with fully loaded, 20 yd (min.) tandem dump truck to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated sub-grades. The testing agency geotechnical engineer must be present for proof roll.

E. Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as recommend by the testing agency geotechnical engineer and and directed by OWNER/ENGINEER.

3.9 UNAUTHORIZED EXCAVATION

A. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the testing agency geotechnical engineer and the OWNER/ENGINEER.

B. Unauthorized excavation, as well as remedial work directed by the testing agency geotechnical engineer and the OWNER/ENGINEER shall be at CONTRACTOR's expense.

C. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete or LSM fill may be used when approved by the testing agency geotechnical engineer and the OWNER/ENGINEER.

1. Fill unauthorized excavations under other construction or utility pipe as directed by the testing agency geotechnical engineer and the OWNER/ENGINEER.

2. Consists of material removal beyond indicated subgrade elevations or dimensions without specific direction of the testing agency geotechnical engineer and the OWNER/ENGINEER.

3. Correct unauthorized excavation, as well as remedial work as directed by the testing agency geotechnical engineer and the OWNER/ENGINEER, at no additional cost to OWNER.

4. Backfill and compact other unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the testing agency geotechnical engineer and the OWNER/ENGINEER.

3.10 ADDITIONAL EXCAVATION:

A. When excavation has reached required subgrade elevations, notify soils testing laboratory for examination of conditions.

B. If unsuitable bearing materials are encountered at required subgrade elevations, excavate deeper and replace excavated material as directed by soils testing laboratory.

C. Removal of unsuitable material and its replacement as directed will be paid on basis of Contract conditions relative to changes in Work. Proof rolling is to be included.

3.11 COLD WEATHER PROTECTION

A. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F. (1-degree C.).

3.12 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials when and where directed by the testing agency geotechnical engineer and the OWNER/ENGINEER. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water away. Cover stockpiles to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

2. Prevent saturation of soil above the optimum moisture content.

3. Install silt fence/ silt sock around periphery of any topsoil stockpiles

3.13 BACKFILL

A. Place and compact backfill in excavations promptly, or within time as specified by the Contract Documents, but not before completingthe following:

1. Construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.

2. Surveying locations of underground utilities for record documents.

3. Inspecting and testing underground utilities.

4. Concrete and masonry have cured 28 days and is adequately braced.

5. Removing concrete formwork.

6. Removing trash and debris.

7. Removing temporary shoring and bracing, and sheeting.

8. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.14 FILL

A. Preparation: remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

B. Plow, scarify, bench, or break up sloped surfaces steeper than 8 H to 1 V so fill material will bond with existing material. Bench into the existing slope per ODOT Document GB2 Special Benching and Side fill Embankment Fills and in addition as follows:

a. Scalp the existing slope according to ODOT Item 201.
b. Cut horizontal benches in the existing slope to a sufficient width to blend the new embankment with the existing embankment and to accommodate placement, and compaction operations and equipment.
c. Bench the slope as the embankment is placed and compact in layers.
d. Begin each bench at the intersection of the existing slope and the vertical cut of the previous bench. Recompact the cut materials along with the new embankment.

C. Place and compact fill material in layers to required elevations at locations as follows:

1. Under grass and planted areas, use satisfactory screened topsoil.

2. Under walks and pavements, ODOT 304 Aggregate Base and if subgrade is deficient provide engineered fill. Extend five (5) beyond the pavement edge and shall include the support slopes to their full width.

3. Under steps and ramps, use structural fill.

4. Under building slabs, use structural fill unless noted otherwise on structural drawings. Extend five (5) beyond the building edge and shall include the support slopes to their full width.

5. Under footings and foundations, use structural fill unless noted otherwise on structural drawings.

6. Drainage fill material shall be proof rolled to a uniform stable condition prior to placement of vapor retarder.

7. Do not place fill on frozen ground

3.15 MOISTURE CONTROL

A. Uniformly moisten or aerate sub-grade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove & replace, or scarify & air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 % and is too wet to compact to specified dry unit weight

3.16 COMPACTION OF BACKFILLS AND FILLS

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

C. Compact soil to not less than the following percentages of maximum dry unit weight according to Std. Proctor test ASTM D 698.

1. Unless specified elsewhere in the Geotechnical Report, under structures, building slabs and steps the compaction should be a minimum of 100 percent of the optimum density.

2. Under walkways, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 98 percent (Standard Proctor).

3. Under lawn or unpaved areas, scarify and re-compact top 6 inches below sub- grade and compact each layer of backfill or fill material at 95 percent.

4. Top 12” of sub-grade under roadways, drives, parking areas, foundations, backfill, footings, pads, paved pedestrian walks and courts, loading docks and paving primarily for vehicle traffic, the compaction shall be a minimum of 100 percent.

3.17 SUB-BASE AND BASE COURSES

A. Under pavements and walks, place sub-base course on prepared sub-grade and as follows:

1. Place base course material over sub-base.

2. Compact sub-base and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 100 percent of maximum dry unit weight according to ASTM D 698 (standard proctor).

3. Shape sub-base and base to required crown elevations and cross-slope grades.

4. When thickness of compacted sub-base or base course is 6 inches or less, place materials in a single layer.

5. When thickness of compacted sub-base or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

B. Pavement shoulders: place shoulders along edges of sub-base and base course to prevent lateral movement. Construct shoulders, at least 60 inches wide, of satisfactory soil materials and compact simultaneously with each sub-base and base layer to not less than 100 percent of maximum dry unit weight according to ASTM D 698.

3.18 GRADING

A. See Section 31 22 00 Grading

3.19 PROTECTION

A. Protecting graded areas: protect newly graded areas from traffic, freezing, and erosion. Keep all areas graded to drain, free of ruts, ponding water, trash, and debris. CONTRACTOR is to pump off all ponding water immediately. Keep free of trash and debris.

B. Repair and reestablish grades to specify tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and re-compact.

C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible, as satisfactory to the OWNER/ENGINEER.

D. Protect areas with slopes exceeding 3 H to 1 V with erosion-control fiber mesh and with erosion-control blankets installed and stapled according to

manufacturer's written instructions.

E. Unless noted otherwise, protect areas with slopes not exceeding 3 H to 1 V by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

Anchor straw mulch by crimping into topsoil with suitable mechanical equipment, use tackifier, or erosion control netting. Maintain during construction

3.20 FIELD QUALITY CONTROL

A. Testing agency: The OWNER will engage a qualified independent Geotechnical Engineering testing agency to perform field quality-control testing/compliance.

B. Allow testing agency to inspect and test sub-grades and each fill/backfill layer. Proceed with subsequent earthwork only after field test results for previously completed work comply with requirements.

C. Footing Sub-grade: at footing sub-grades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing sub-grades may be based on a visual comparison of sub-grade with tested sub-grade when approved by the Geotechnical Engineer.

D. Testing agency will test compaction of soils in place according to ASTM D 698, ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and building slab areas: at sub-grade and at each compacted fill and backfill layer, at least one test for every 2,000 S.F. or less of paved area or building slab, but in no case fewer than three tests. In each compacted fill layer, make one field density test for every 2,000 sq. feet of overlaying building slab or paved area, but in no case less than 2 tests. Field density tests shall be made at all walkway entrances and ramps into the proposed building.

2. Foundation wall backfill: at each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.

3. Trench backfill: at each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

4. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent evaluation and approval of each footing subgrade should be performed by Geotechnical Testing Agency.

5. Lawns, athletic fields and areas receiving topsoil: Perform field density tests on a spot-check basis to assist the CONTRACTOR in determining if compaction is in accordance with the specifications.

E. When testing agency reports that sub-grades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten, aerate, or remove and replace soil to depth required; re-compact and retest until specified compaction is obtained.

3.21 TESTING AND INSPECTION

A. INSPECTION AGENCY: Inspect and test construction of embankments, fills, backfills, trenches, and subgrades and report to the OWNER/ENGINEER conformance in all particulars to specification requirements.

B. Scheduling:

1. Assign qualified personnel to be on site at all times when operations are scheduled.

2. The CONTRACTOR should note that no earthwork operation shall be permitted in their absence.

C. Responsibilities:

1. Evaluation of subgrade preparation and suitability.

2. Moisture content and field density tests on all layers of fill and backfill material placed.

3. Evaluation of degree of compaction attained for all fill and backfill material placed.

4. Testing and evaluation of borrow material.

5. Sources of borrow and of select fill.

6. Footing subgrade suitability.

7. Inspection of installation of subdrainage system.

D. Results of Tests:

1. Make results available to the OWNER/ENGINEER immediately upon completion of areas of layers.

E. Final Report: The Geotechnical Testing Agency shall prepare a written report

that summarizes the work inspected during the course of the project. A discussion of all deviations from the contract documents and specifications, with their related impact on the final construction, shall be described in detail. The engineer of record shall review this final report and recommend corrective measures (as deemed necessary) that must be made prior to final acceptance of the work. Prior to final payment, a written report certifying that the work meets the requirements of the contract documents, specifications, and all governing agencies shall be prepared, submitted, and approved by the ENGINEER.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off-site.

1. Do not burn or bury removed materials on project site.

2. If hazardous materials are encountered during clearing operations, notify the Engineer for additional instructions. Comply with laws and ordinances concerning removal, handling and protection against exposure or environmental pollution.

END OF SECTION 31 20 00

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WERTZ

GEOTECHNICAL ENGINEERING

DRILLING | MATERIAL TESTING | ENGINEERING

GEOTECHNICAL EXPLORATION REPORT

FOR THE

CITY OF CANTON COLLECTION SYSTEMS: SERVICE CENTER BUILDING ADDITION
2901 REGENT AVENUE NE
CANTON, OHIO 44705

WGE #20211097

PREPARED FOR

MOTTER & MEADOWS ARCHITECTS
600 MARKET AVENUE NORTH
CANTON, OHIO 44702

BY

WERTZ GEOTECHNICAL ENGINEERING, INC.
400 COLLIER DRIVE
DOYLESTOWN, OHIO 44230

WERTZ
GEOTECHNICAL ENGINEERING

DRILLING | MATERIAL TESTING | ENGINEERING

July 15, 2021

Motter & Meadows Architects
600 Market Avenue North
Canton, Ohio 44702

ATTN: **David I. Patterson, Architect**

RE: **Geotechnical Exploration Report for City of Canton Collection Systems Service Center Building Addition; Canton, Ohio**
WGE #20211097

Dear Mr. Patterson:

Wertz Geotechnical Engineering (WGE) has completed the requested subsurface investigation for the proposed City of Canton Collection Systems Service Center building addition project in the City of Canton, Ohio. The purposes of this investigation are to define the subsurface conditions at the project site and to make general recommendations relative to site preparation and earthwork, foundation design, construction, and other pertinent geotechnical aspects of the project. These professional services have been performed, the findings obtained, and the recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. If you have any questions or concerns regarding the information presented in this submittal, or have need of additional services, please contact our office at (330) 991-0041.

Sincerely,

Leroy Wertz

Leroy Wertz, P.E.
Senior Project Engineer

Kelly Luecke

Kelly Luecke, P.E.
Project Engineer

STATE OF OHIO
LEROY D. WERTZ
E-69643
REGISTERED PROFESSIONAL ENGINEER

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PROJECT DESCRIPTION

SITE DESCRIPTION

The project site for the proposed City of Canton Collection Systems Service Center Building Addition project is 2901 Regent Avenue NE in the City of Canton, Ohio. The site is located on the west side of Regent Ave NE, approximately 700 feet south of 30th Street NE. The site is currently developed with a large metal building, asphalt pavement, outdoor materials storage, grass and trees with a perimeter fence. The terrain of the development location is generally flat, and falls slightly toward the southwest.

A preliminary site plan, undated, was provided. The proposed building addition is 10,730 square feet, roughly 104 foot square, to be constructed onto the west end of the northern face of the existing building. A new parking area to the north, and a reconfiguration of a portion of the existing parking is also proposed.

A proposed grading plan, finished floor elevation, and structural loadings were not yet available at the time of this geotechnical analysis. The proposed building addition is assumed to be consistent with the existing building which is a high-bay metal building with slab-on-grade construction. The maximum loadings for the pre-engineered metal addition are assumed to not exceed 75 kips for columns and 3 kips per foot for walls. The planned foundation systems will be shallow spread footings. Cut and fill depths for the building pad are not expected to exceed four (4) feet.

If our project understanding or any of our project assumptions are incorrect, we should be contacted in order to determine if our recommendations remain valid.

DESCRIPTION OF REGIONAL GEOLOGICAL SETTING

The project site in Canton, Stark County is situated in the Akron-Canton Interlobate Plateau Physiographic Region of Ohio, which is defined by a hummocky area between two converging glacial lobes dominated by kames, kame terraces, eskers, kettles, kettle lakes, and bogs/fens, and exhibiting deranged drainage with many natural lakes (Ohio Department of Natural Resources Division of Geological Survey, 1998).

According to the USDA Web Soil Survey, the site area is mapped by the local soil and water conservation district as Wheeling and Weinbach Silt Loams, materials derived from alluvium (river sediment) and deposited over glacial outwash sands and gravels. Additionally, the areas around the existing collection systems service center are mapped as udorthents, materials that have been disturbed, filled, or graded but have some similarity to the undisturbed subsoils of the surrounding area (USDA, 2021). A USDA Web Soil Survey site map is presented in Figure 2.

According to publicly available mine data from ODNR, a historic surface coal mine is directly adjacent to the site, just east of Regent Ave NE. This surface mine is not shown mapped into the

site area or building footprint. An active, surface sand and gravel mine is mapped within a mile north of the site area.

According to 24k Ohio Division of Geological Survey (ODNR-DGS) Bedrock Geology Maps, bedrock in the area consists of the Allegheny and Pottsville Groups, undivided, of which major lithologies consist of shale and siltstone. The minor lithologies consist of limestone and sandstone (Ohio Department of Natural Resources Division of Geological Survey, 1991). Bedrock is reported by ODNR-DGS near 850 feet MSL in elevation, which is approximately 230 feet below the existing grades onsite. A Geologic Map is presented in Figure 3.

FIELD INVESTIGATION & LABORATORY TESTING

Nine (9) borings were advanced to depths ranging from 10 to 20 feet below the existing grades at the project site on June 24th and 25th, 2021, utilizing a CME-45 all-terrain rotary drilling rig with 2.25" hollow stem augers operated by Wertz Geotechnical Engineering, Inc. (WGE) drilling staff. The boring locations were selected by Motter & Meadows Architects, approved by a geotechnical engineer, and staked in the field utilizing a handheld GPS unit, as is shown on the attached Figure 1 Geotechnical Boring Location Map.

Standard penetration testing and sampling was performed at the depth intervals shown on the attached Boring Logs utilizing a 140-lb automatic hammer falling 30 inches to drive a 2-inch outer-diameter split spoon sampler over three (3), six-inch intervals. Collected samples were examined and visually identified by our personnel in the field based on the visual-manual procedure (ASTM D-2488). Representative samples were retained and transported to our office, for further examination and the assignment of laboratory testing. Auger samples were retained and transported to our office for further examination and the assignment of laboratory testing by one of our geotechnical engineers. Details of each boring are shown in Attachment A, Geotechnical Boring Logs.

Moisture content testing was performed per ASTM D-2216. Forty-one (41) moisture content tests were conducted on the retained samples. A description of the results is included on the attached Boring Logs.

Static groundwater level observations and hole depth soundings were made upon completion of each boring, which was followed by backfilling the holes. Groundwater level observations made at each boring are indicated on the attached Soil Boring Logs. It should be noted that groundwater levels and zones of saturation should be expected to fluctuate seasonally based on variation in amounts of rainfall, evapotranspiration, runoff from impervious areas, and several other factors.

SUBSURFACE CONDITIONS

Soil boring data collected at the site found variable native (non-fill) sand, sand/gravel, silt and clayey soils. A shallow layer of silty fill material was encountered in Borings B-2 and B-8. These findings can be described for engineering purposes as the following:

- Topsoil was present to approximately 6-inch depth at the soil boring locations.
- Silt, sand, clay and sand/gravel soils were encountered on the site. The granular soils were dry/damp to wet and very loose to medium dense, where tested. The clayey soils were damp to moist and soft to very stiff.
- Very loose silt soil was encountered in Boring B-1 from approximately 8 to 12 feet of depth. Very loose silt soil was also encountered in B-6 from approximately 3 to 6 feet of depth, underlain by moist, soft clay soil to the boring termination of 10 feet depth.
- Fill soils were encountered below the surface in Borings B-2 and B-8 to a depth of approximately 3 feet. The fill was a medium dense silty material which was damp to damp/moist and included small quantities of gravel, coal and glass.
- Groundwater was encountered at Borings B-1 and B-8 at 8.5 feet depth. No groundwater was observed in the bore hole after completion of drilling.
- For all the borings, please refer to the attached Boring Logs for specific information related to the types, depths, and stratification of the material encountered onsite.

GEOTECHNICAL RECOMMENDATIONS

We offer the following for your consideration based on our analysis of the subsurface conditions encountered at the locations indicated; and the assumption that conditions between and away from the borings are similar to those that are known:

GENERAL CONSIDERATIONS

A very loose silt soil layer is present at a depth between 8 to 12 feet in Boring B-1. Wall loads less than 3 kips/feet and column loads less than 75 kips can be supported by a shallow footing with an allowable bearing pressure of 1,500 psf. The calculated load limitations are working loads and do not have factors from LRFD design. All foundations for the building should be designed with the low bearing pressure of 1,500 psf, due to the unknown limits of the very loose layer. Dynamic cone penetration test should be performed at the foundation subgrade to verify the bearing capacity. If unsuitable bearing soils are encountered, foundation subgrade should be undercut to loose, medium stiff or better soils with the undercut backfilled with additional foundation concrete.

Loose to very loose surface soils were encountered in the proposed pavement areas in Borings B-5 and B-6. These soils will likely be unstable during construction. Additional cost for stabilizing the pavement subgrade should be anticipated. To provide a stable subgrade, the unstable subgrades should be undercut and backfilled with properly compacted stone fill material. The maximum undercut depth for the pavement subgrade should be 2 feet below the

pavement elevation. If soft or very loose soils are present at the 2 feet undercut depth, a layer of Tensar BX-1200 geogrid (or equivalent) should be placed on the exposed surface. The undercut should be backfilled with compacted #304 crushed stone.

EXCAVATIONS

Groundwater was encountered below 8 feet depth at the test borings. Groundwater in excavations less than 8 feet can be controlled with pumps within the excavation.

Excavations should either be sloped back or shored in accordance with Occupational Safety & Health Administration (OSHA) regulations and any other applicable local codes. Parameters for design of temporary shoring are included in those regulations. Due to the presence of very soft clay soils encountered, the site soils should be classified as Type "C" per OSHA. Therefore, temporary excavations should be cut back to a temporary slope no steeper than a 1.5:1 (horizontal: vertical).

The existing soils can likely be excavated with a medium-sized hydraulic excavator equipped with a conventional earth excavating bucket.

EARTHWORK GUIDELINES

- Prior to construction, all existing topsoil, asphalt pavement, soft soils, and debris should be completely stripped from within the footprint of the proposed building and pavement areas and areas to be cut or to receive fill and wasted from the site.

- All surfaces cut to subgrade elevation or subgrades to receive fill should be proof rolled under the direction of an on-site geotechnical engineer or his direct assigns. Any areas of soft soils, uncontrolled fill, or obviously contaminated zones should be undercut or stabilized as directed by the engineer. As indicated above, unstable subgrade soils are anticipated near Borings B-5 and B-6. It is likely that other unstable areas will be found during the proof-roll.

- After completion of cutting the site to grade, and after backfilling excavation areas, pavement and building areas at planned subgrade elevations should be densified via multiple passes of heavy compaction equipment, prior to placement of granular base and construction of slabs on grade and pavements. This will help provide a more uniform support condition for the pavements and floor slabs.

- The engineered fill should be clean, inert soil which should be approved by the geotechnical engineer. The engineered fill should have a dry density greater than 100 pcf, liquid limit less than 50% and an organic content less than 2%.

- Fill material should be placed on a stable, approved subgrade in controlled lifts. Each lift of engineered fill should be compacted to a stable condition and to at least 98% of its maximum dry density as determined by a standard proctor (ASTM D-698), with a

moisture content between 2% below and 2% over optimum moisture. Granular soils should be compacted to at least 80% of the material's relative density. Granular soils are defined as sand and gravel soils with less than 20 percent of material by mass passing the #200 sieve. All filling operations should be observed by a qualified soils technician under the supervision of the geotechnical engineer. Field density tests should be made to ensure compaction to specification.

- All surfaces should be sealed and sloped after each day or prior to inclement weather to promote positive drainage of water offsite.

- Construction traffic should be kept off any wet subgrades. If site work is performed during times of drier weather, the need for additional repairs and stabilization to the subgrade may be substantially reduced. Therefore, it is recommended that site work be performed during these times.

BEARING CAPACITY AND FOUNDATIONS

Wall loads less than 3 kips/foot and column loads less than 75 kips can be supported by a shallow spread and strip footing foundation systems. A very loose layer of silty soil was encountered in Boring B-1 at a depth of 8 to 12 feet depth. All building foundations should be designed for a gross allowable bearing pressure of 1,500 psf. The calculated load limitations are working loads and do not have factors in LRFD design. Larger foundation loadings should be supported by a helical pier foundation system, which is beyond the scope of this report. The following provisions for foundation design and construction should apply:

- The foundation subgrades, for a gross allowable design bearing pressure of 1,500 psf, should consist of loose granular soil, medium stiff lean clay soil, approved engineered fill, or better soils. The foundation subgrade should be evaluated and approved by a geotechnical engineer, or their representative, prior to concrete placement. Any deleterious foundation subgrade soils be undercut and backfilled with additional foundation concrete.

- The foundation subgrades should be concreted in a dry and frost-free condition as soon after exposure as possible.

- The ground surface, surrounding the building, should be graded to direct surface drainage of water away from all exterior foundation walls and members.

- All footings should be located below the depth of potential frost penetration (3.5 feet).

SEISMIC SITE CLASSIFICATION

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Seismic Site Classification is required to determine the Seismic Design Category for a structure. The Seismic Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, Standard Penetration Test

(SPT) resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7. The site properties below the boring depths to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area.

Based upon the soil stratigraphy encountered in the borings and the SPT blow counts, it is the opinion of WGE that the site is best characterized as Seismic Site Class “D”. This Seismic Site Classification should be used for design of the structure, according to the Ohio Building Code and Related Codes, section 1613.5.2 "Site Class Definitions."

SLAB AND PAVEMENT SUPPORT

Pavements and concrete floor slabs should be adequately supported on stable, approved site soils prepared according to Earthwork Guidelines and on stable engineered fill placed and compacted to the above-provided specifications. Additional cost should be anticipated to stabilize the pavement subgrade due to soft and/or very loose subgrade soils found near the surface in Borings B-5 and B-6. The unstable subgrades should be undercut and backfilled with properly compacted stone fill material. The maximum undercut depth for the pavement subgrade should be 2 feet below the pavement elevation. If soft or very loose soils are present at the 2 feet undercut depth, a layer of Tensar BX-1200 geogrid (or equivalent) should be placed on the exposed surface. The undercut should be backfilled with compacted #304 crushed stone.

All floor and pavement subgrades should be proof rolled after they are graded and immediately prior to granular base placement. Any unstable areas will need to be scarified, dried and recompacted to a stable condition. Any organically contaminated soils, in building and pavement areas, should be undercut and backfilled with an approved compacted engineered fill.

Floor slab subgrades should be evaluated prior to stone placement by our personnel. All interior industrial floor slabs should be provided with a minimum of 4 inches of free-draining granular subbase ODOT #304 limestone, or an approved equivalent, with a suitable vapor barrier. All exterior concrete slabs should have a minimum of 4 inches of ODOT #304 crushed limestone base.

Flexible (asphaltic concrete) pavements should be designed for the anticipated traffic loading using a California Bearing Ratio (CBR) of 5 and a corresponding Resilient Modulus (Mr) of 6,000 psi. The parking lot should consist of a minimum of 6 inches of #304 crushed limestone overlain by 2.5 inches of #441 Type II intermediate course, and 1.5 inches of #441 Type I finished course. This pavement section assumes that the parking lot will only be used for light weight traffic. The pavement section for the main drive lane should consist of 6 inches of #304 crushed limestone, 5 inches of #301 base asphalt, and 1.5 inches of #441 Type I finish course.

Finger drains and curb drains positively drained to the catch basins should be provided in parking and driving areas and in the area of the dumpster pad to allow for positive drainage of the stone base.

STANDARD OF CARE AND LIMITATIONS

Our recommendations for this project were developed utilizing the project information provided to WGE and the soil information obtained from the test borings that were made at the project site. The test borings only depict the soil conditions at the specified locations and time at which they were made. The soil conditions at other locations on the site may differ from those occurring at the boring locations. Additionally, the conclusions and recommendations have been based upon the available soil information and the design details furnished to us. We should be immediately notified, if during construction, any conditions different from those found in this investigation are evident or our project assumptions or understanding are incorrect. We will advise you of any modifications to our conclusions and recommendations deemed necessary, after observing the exposed conditions and/or changes to the project scope. The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Wertz Geotechnical Engineering, Inc. is not responsible for the conclusions, opinions, or recommendation made by others based upon the data included herein.

We hope you will find this report satisfactory. Please contact our office if we can be of further service or you have questions regarding this submittal.

Respectfully submitted,

Kelly Luecke

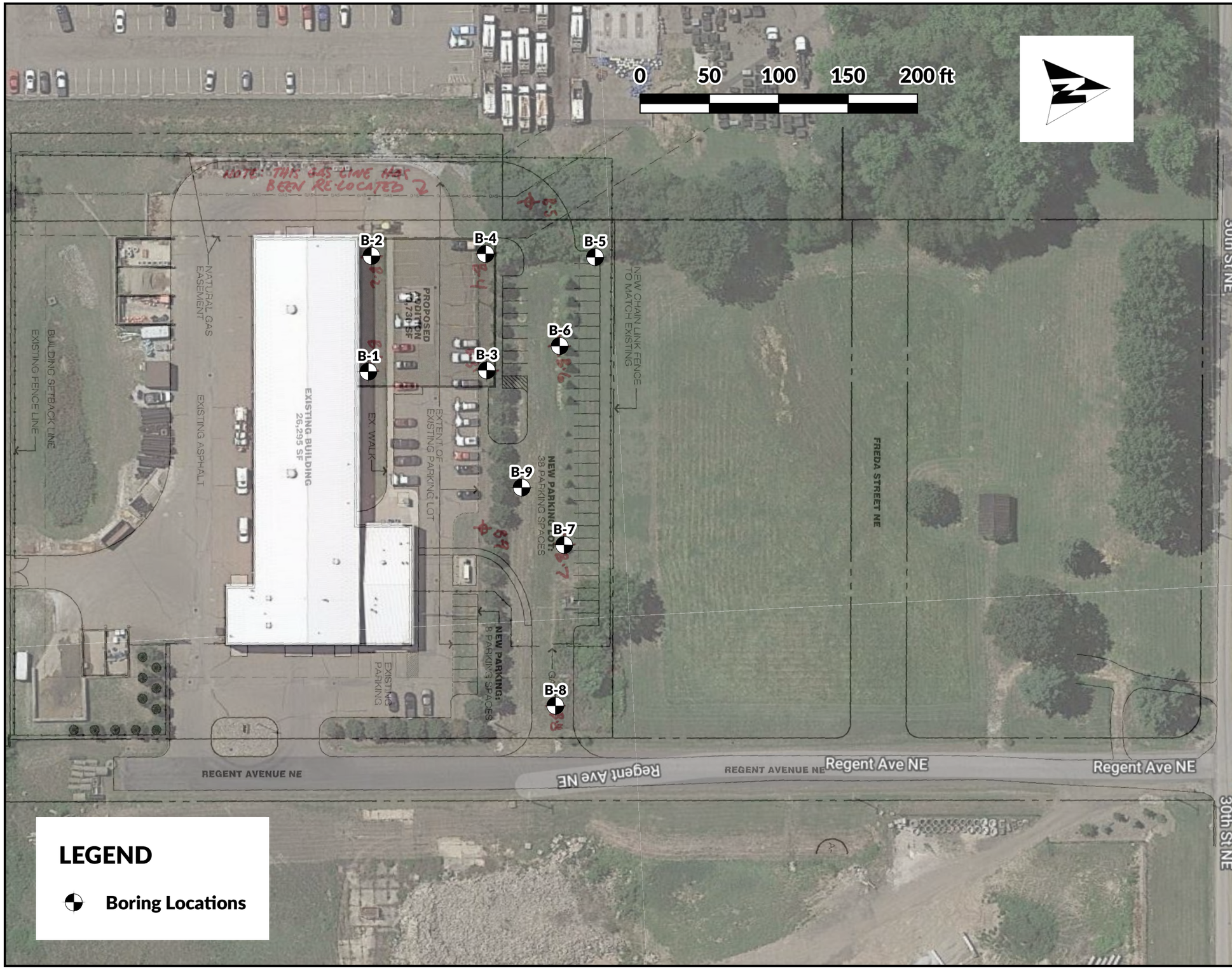
Kelly Luecke, P.E.
Project Engineer

Leroy Wertz

Leroy Wertz, P.E.
Senior Project Engineer

FIGURE 1

Geotechnical Boring Location Map



LEGEND

Boring Locations

WERTZ

GEOTECHNICAL ENGINEERING

400 Collier Drive, Doylestown, Ohio 44230

330-991-0041

OFFICE@WERTZGEO.COM

GEOTECHNICAL BORING LOCATION MAP

CLIENT

MOTTER AND MEADOWS ARCHITECTS

600 MARKET AVE NORTH, CANTON, OHIO 44702

SITE

2901 REGENT AVE NE CANTON, OH 44705

PROJECT NAME

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER BUILDING ADDITION

LAYOUT BY CD	DATE: 7/15/2021
DRAWN BY CD	FIGURE NO. 1
CHECKED BY LW	

FIGURE 2

USDA Web Soil Survey Map

Map Scale: 1:1,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Stark County, Ohio
Survey Area Data: Version 17, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 25, 2014—Mar 21, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CuB	Chili-Urban land complex, undulating	0.0	0.0%
Ua	Udorthents	2.0	41.2%
WhA	Weinbach silt loam, 0 to 2 percent slopes	1.0	21.4%
WrA	Wheeling silt loam, 0 to 3 percent slopes	0.1	1.5%
WrB	Wheeling silt loam, 3 to 8 percent slopes	1.7	35.8%
Totals for Area of Interest		**4.8**	**100.0%**

FIGURE 3

ODNR Bedrock Geology Map

CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER ADDITION PROJECT GEOLOGIC MAP

Bedrock Topography of Ohio 24K (ODNR-DGS) -Bedrock Topography 24K - Contours

Bedrock Topography Contour (50-ft Interval), data from ODNR-DGS)

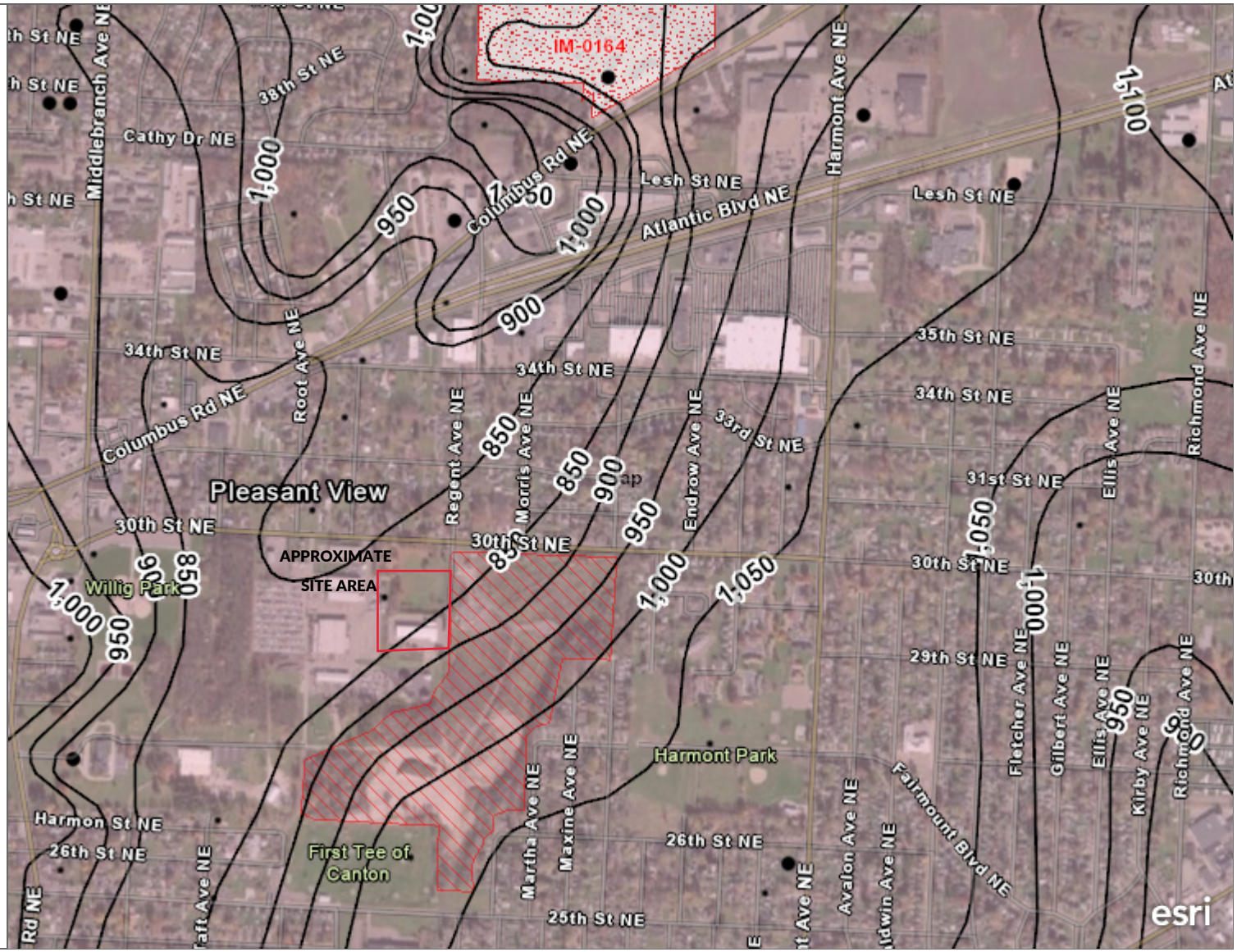
Oil-and-gas well

Water well, data from ODNR

-Bedrock Geology 24K
-Data Bedrock Geology of Ohio 24K (ODNR-DGS)

IPap - *Allegheny and Pottsville Groups, Undivided*
Major: Shale, Siltstone
Minor: Limestone, Sandstone

Bedrock Contours are interpolated by ODNR-DGS based on data from local water wells and oil and gas wells.



Bedrock is estimated to be within approximately 230 feet of current site grades.

0.2mi

Ohio Department of Natural Resources-Division of Geological Survey | Maxar | Esri Community Maps Contributors, Stark County GIS, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

ATTACHMENT A

Geotechnical Boring Logs

WERTZ GEOTECHNICAL ENGINEERING, INC.
DRILLING | MATERIAL TESTING | ENGINEERING

400 COLLIER DRIVE
DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-1	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.R		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	J.A & B.B		HAMMER:	Auto SPT	ELEVATION:	1077 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	8.5'	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	20'	CAVE DEPTH:	17'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1–2	1	1.0-2.5	6-7-8	8	-		Dry to damp, medium dense, brown, fine to coarse SAND, minor gravel. Wn%: 5.3
3–5	2	3.5-5.0	8-7-4	16	-		Moist, medium dense, brown, silty, very fine to fine SAND, minor gravel. Wn%: 13.3
6–7	3	6.0-7.5	0-0-5	18	1		TOP 12": Moist, medium stiff, brown and gray CLAY. Wn%: 36.5
7–8							BOTTOM 6": Moist, loose, brown, fine SAND, minor gravel, trace of silt.
9–12	4	8.5-10.0	4-1-2	12	-		Wet, very loose, gray SILT, minor fine to coarse sand, trace of clay and organics. Wn%: 13.9
13–17	5	13.5-15.0	2-2-3	18	0.75		Moist, medium stiff, brown, silty CLAY. Wn%: 23.1
18–20	6	18.5-20.0	4-5-5	14	-		Damp to moist, medium dense, brown, fine SAND, trace of gravel. Wn%: 6.2

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

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400 COLLIER DRIVE
DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-2	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.R		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	J.A & B.B		HAMMER:	Auto SPT	ELEVATION:	1077 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	20'	CAVE DEPTH:	17'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1–2	1	1.0-2.5	8-8-5	14	-		FILL: Damp, medium dense, brown, fine to coarse, sandy SILT, minor gravel (contains coal). Wn%: 7.7
3–8	2	3.5-5.0	4-3-3	8	-		Moist, loose, brown, fine to coarse, SAND and GRAVEL, minor silt. Wn%: 10.9
9–12	3	8.5-10.0	2-2-3	2	-		Dry to damp, loose, brown, fine to coarse, SAND and GRAVEL.
13–17	4	13.5-15.0	2-2-3	18	-		Moist, loose, brown SILT. Wn%: 28.4
18–20	5	18.5-20.0	5-5-5	16	-		Damp, medium dense, brown, fine to coarse, SAND and GRAVEL, trace of silt. Wn%: 10.6

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

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400 COLLIER DRIVE
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(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-3	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.R		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	J.A & B.B		HAMMER:	Auto SPT	ELEVATION:	1078 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	20'	CAVE DEPTH:	17'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1–2	1	1.0-2.5	4-4-3	14	-		Moist, loose, brown, silty, very fine to fine SAND, trace of gravel. Wn%: 10.4
3–7	2	3.5-5.0	3-2-3	16	-		Damp, loose, brown, silty, fine SAND, trace of gravel. Wn%: 10.4
8–12	3	8.5-10.0	2-3-4	10	-		Moist, loose, brown SILT, minor clay, trace of sand. Wn%: 17.4
13–18	4	13.5-15.0	2-4-3	10	-		Moist, loose, brown, fine SAND, trace of gravel. Wn%: 12.6
19–20	5	18.5-20.0	4-3-3	8	-		Damp to moist, loose, brown, fine to coarse SAND, minor gravel Wn%: 6.6

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

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(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-4	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.R		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	J.A & B.B		HAMMER:	Auto SPT	ELEVATION:	1075 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	20'	CAVE DEPTH:	16'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		5" TOPSOIL.
1–2	1	1.0-2.5	8-16-13	14	-		Moist, medium dense, brown, silty, fine to coarse SAND, minor gravel. Wn%: 7.5
3–5	2	3.5-5.0	7-10-11	16	-		Damp, very stiff, brown, clayey SILT, trace of sand and gravel. Wn%: 14.0
6–8	3	6.0-7.5	5-7-10	11	-		Damp, medium dense, brown, silty, very fine SAND, trace of gravel. Wn%: 10.6
9–13	4	8.5-10.0	4-6-6	12	-		Damp, medium dense, brown, silty, very fine SAND, trace of gravel. Wn%: 12.9
14–18	5	13.5-15.0	5-9-13	14	-		Damp, medium dense, brown, silty, very fine SAND. Wn%: 12.3
19–20	6	18.5-20.0	4-4-5	12	-		Moist, loose, brown, fine to coarse SAND, minor gravel, trace of silt. Wn%: 8.4

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

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DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-5	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.A		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	T.T & B.B		HAMMER:	Auto SPT	ELEVATION:	1077 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	10'	CAVE DEPTH:	6'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		6" TOPSOIL.
2	1	1.0-2.5	2-3-3	8	-		Moist, loose, brown SILT, minor clay, trace of organics Wn%: 17.6
4	2	3.5-5.0	3-2-2	13	-		Moist, loose, brown SILT, minor fine sand. Wn%: 14.4
7	3	6.0-7.5	2-3-4	13	-		Moist, medium stiff, brown, clayey SILT, minor fine to coarse sand and gravel. Wn%: 16.3
9	4	8.5-10.0	1-3-3	16	-		Moist, medium stiff, brown, silty CLAY, trace of sand and gravel. Wn%: 15.9

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

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PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-6	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/25/2021	
LOGGED BY:	J.A		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/25/2021	
DRILL CREW:	T.T & B.B		HAMMER:	Auto SPT	ELEVATION:	1078 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	10'	CAVE DEPTH:	6'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1							
2	1	1.0-2.5	2-2-2	8	-		Moist, loose, brown, fine, sandy SILT, trace of gravel. Wn%: 10.5
3							
4	2	3.5-5.0	2-1-2	9	-		Moist, very loose, brown, fine, sandy SILT, minor clay. Wn%: 13.2
5							
6							
7	3	6.0-7.5	2-1-2	13	-		Moist, soft, brown, silty CLAY, some fine sand in seams, trace of gravel. Wn%: 15.0
8							
9	4	8.5-10.0	3-2-2	12	-		Moist, soft, brown and gray, silty CLAY, minor fine sand. Wn%: 12.7
10							***NOTE:*** *Ground surface elevations at boring locations estimated from data available on Google Earth.*
11							
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400 COLLIER DRIVE
DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-7	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/24/2021	
LOGGED BY:	J.A		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/24/2021	
DRILL CREW:	T.T & B.B		HAMMER:	Auto SPT	ELEVATION:	1079 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	10'	CAVE DEPTH:	6'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1							
2	1	1.0-2.5	2-7-7	16	-		Damp, medium dense, brown, silty, fine SAND. Wn%: 8.5
3							
4	2	3.5-5.0	2-5-7	18	1.5		Moist, stiff, brown, silty CLAY, minor fine sand, trace of gravel. Wn%: 12.8
5							
6							
7	3	6.0-7.5	9-14-15	18	-		Dry to damp, medium dense, brown, fine to coarse SAND and GRAVEL. Wn%: 3.2
8							
9	4	8.5-10.0	9-12-12	18	-		Dry to damp, medium dense, brown, fine to coarse SAND, minor gravel. Wn%: 3.7
10							***NOTE:*** *Ground surface elevations at boring locations estimated from data available on Google Earth.*
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DRILLING | MATERIAL TESTING | ENGINEERING

400 COLLIER DRIVE
DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-8	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/24/2021	
LOGGED BY:	T.T		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/24/2021	
DRILL CREW:	J.A & B.B		HAMMER:	Auto SPT	ELEVATION:	1082 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	8.5'	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	10'	CAVE DEPTH:	6'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
1		AS	--	--	--		2" TOPSOIL.
2	1	1.0-2.5	3-5-6	12	-		FILL: Damp to moist, medium dense, brown and black SILT, trace of sand and gravel (contains glass and coal fragments). Wn%: 17.6
3							
4	2	3.5-5.0	2-4-5	15	-		Moist, stiff, brown, silty CLAY, minor fine sand. Wn%: 16.2
5							
6							
7	3	6.0-7.5	7-6-7	15	-		Moist, medium dense, brown, very fine, sandy SILT. Wn%: 22.3
8							
9	4	8.5-10.0	4-5-4	18	-		Wet, loose, brown, fine, sandy SILT, minor clay and gravel. Wn%: 13.5
10							***NOTE:*** *Ground surface elevations at boring locations estimated from data available on Google Earth.*
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WERTZ GEOTECHNICAL ENGINEERING, INC.
DRILLING | MATERIAL TESTING | ENGINEERING

400 COLLIER DRIVE
DOYLESTOWN, OHIO, 44230
(330) 991-0041

PROJECT:	City of Canton Collection Systems Service Center Addition	PROJECT NO.: 20211097	DRILL RIG:	CME45	BORING ID:	B-9	
LOCATION:	2901 Regent Ave NE, Canton, Ohio 44705		METHOD:	Hollow Stem	DATE STARTED:	6/24/2021	
LOGGED BY:	J.A		AUGER SIZE:	2.25 inches	DATE COMPLETED:	6/24/2021	
DRILL CREW:	T.T & B.B		HAMMER:	Auto SPT	ELEVATION:	1079 feet MSL	
GROUNDWATER ENCOUNTER DEPTH:	None	GROUNDWATER AT COMPLETION: None	TOTAL DEPTH:	10'	CAVE DEPTH:	6'	

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE DEPTH	BLOW COUNTS (BLOWS/FOOT)	RECOVERY (INCHES)	POCKET PEN (TSF)	GRAPHIC LOG	LITHOLOGY
		AS	--	--	--		6" TOPSOIL.
1–2	1	1.0-2.5	8-12-11	18	-		Dry to damp, medium dense, brown, fine, sandy SILT, minor gravel. Wn%: 10.0
3–5	2	3.5-5.0	7-13-11	15	-		Dry to damp, medium dense, brown, fine to coarse, SAND and GRAVEL. Wn%: 3.0
6–8	3	6.0-7.5	5-6-6	18	-		Dry to damp, medium dense, brown, fine SAND, trace of gravel. Wn%: 3.7
9–10	4	8.5-10.0	6-6-5	15	-		Dry to damp, medium dense, brown, fine SAND, minor gravel. Wn%: 4.9

NOTE: *Ground surface elevations at boring locations estimated from data available on Google Earth.*

SECTION 31 22 00 - GRADING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the following.

1. Rough Grading
2. Finish Grading
3. Stockpiling of topsoil and subsoil
4. Disposal of unsuitable and excess materials

1.2 DEFINITIONS

A. "Topsoil": natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shades of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, and other objects more than 1-1/2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.3 SUBMITTALS

A. For projects with storm water management systems provide final As Built survey and letter certifying storm water detention, retention, bio-retention cells have been constructed to the plan dimensions shown on the plans.

1.4 QUALITY ASSURANCE

A. Pre-installation conference: Conduct conference at project site PART 2

PART 2 – PRODUCTS

2.1 NA

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify survey benchmarks and intended elevations of work.

B. Verify all Storm Water Pollution Prevention Plans erosion control measures have been installed correctly prior to commencing work.

C. Immediately notify the if suspected hazardous materials are encountered and cease operations in that area.

D. Identify areas loosened by frost action, softened by flowing or weather, or containing unsuitable materials.

3.2 PREPARATION

A. Remove material loosened by frost action, softened by flooding or weather, or containing unsuitable material. Replace and compact to same requirements as for specified fill in Section 31 20 00 EARTH MOVING.

B. Stake and flag all known utility locations.

C. Identify required lines, levels, grades and benchmarks/datum's.

D. Locate and protect all above ground and below ground utilities, structures, signage, landscaping, light poles, poles and other item.to remain.

E. Notify all private utility owners of work near their facilities.

3.3 GENERAL

A. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.

2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

3.4 EROSION CONTROL

A. All erosion control must comply with:

1. Ohio Rainwater and Land Development Manual and the projects Storm Water Pollution Prevention Plans.

2. Protect areas with slopes exceeding 3H to 1V with erosion-control fiber mesh and with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3. Unless noted otherwise, protect areas with slopes not exceeding 3H to 1V by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/ acre to from a continuous blanket 1-1/2" in loose depth over a seeded area. Spread by hand, blower, or other suitable equipment.

3.5 ROUGH GRADING

A. During all grading work the CONTRACTOR shall provide positive drainage across the site to the temporary storm water facilities.

B. Topsoil remove and stockpile

1. Strip all topsoil from areas that are to be excavated, landscaped, graded, or to have a structure built on it.

2. Do not strip topsoil when wet or during inclement weather such as rain or snow.

3. Separate all organic matter such as root zones, trash debris etc. from topsoil. Dispose of organic material off-site.

4. Provide an area on site to stockpile the topsoil for future use on site or to be hauled away. Provide silt fence around the stockpile area. Keep topsoil away from other site soils.

C. Subsoil removal and stockpiling

1. Remove subsoil from areas that are to be excavated, landscaped, graded, or to have a structure built on it. See project Geotechnical Report for topsoil depth.

2. Do not strip subsoil when wet or during inclement weather such as rain or snow.

3. Provide an area on site to stockpile the topsoil for future use on site or to be hauled away. Provide silt fence around the subsoil area. Keep subsoil away from other site soils.

D. Rough grade lawn area to a maximum of 4 H to 1 V. Steeper grades will require ground cover planting. Provide roundings at top and bottom of banks and at breaks in grade.

E. Benching Slopes: All slopes that are steeper than 4H to 1V shall be benched horizontally to key the fill material into the slope for firm bearing and stability.

F. Stability: Any damaged or displaced subsoil shall be replaced to the same requirements as called for in Section 31 20 00 Earth Moving.

G. Disc level surfaces.

H. Rough grade the site to achieve lines and grades indicated with allowances for imported fill thickness.

I. Provide positive drainage from all buildings per the slope and grades show on the Site Grading Plan.

3.6 FINISH GRADING

A. Prior to commencing with finish grading perform the following:

1. Verify the subgrade prior to the placement of soil is properly contoured to the

elevations shown on the plans and compacted per the requirements of Section 31 20 00 Earth Moving

2. Verify that all backfill has been accepted and approved.

B. Fine grade the site to the final plan elevations shown on the Grading Plan. All uneven areas and depressions shall be corrected to allow for positive drainage. Follow the profile of the subgrade and bring to the final elevations as shown on the plans.

C. Scarify sub-grade to a minimum depth of 5 inches before placement of topsoil. Remove all waste material.

D. Minimum depth for compacted screened topsoil shall be 6 inches for grass and adequate depth for other planting materials.

E. Protect newly graded areas from the elements. Repair all settlement and erosion and re-establish grades to the required elevations prior to acceptance.

F. If unstable soil or subgrade is encountered during construction the CONTRACTOR shall notify the OWNER/ARCHITECT or ENGINEER to approve corrective actions.

1. If approved, the CONTRACTOR shall remove some or all of the unstable soil, place synthetic fabric and over material, or place aggregate refill, the finish graded section using approved material and compacted per Section 31 20 00 Rough Grading.

2. The CONTRACTOR shall coordinate this work with the OWNER/ARCHITECT or ENGINEER in way that final measurements of the corrective measures taken can be measured and quantified.

3.7 STOCKPILING

A. As part of the Site Clearing Plan called for in Section 31 20 00 Site Clearing provide an area on site to stockpile topsoil and excavated subsoil. Do not place the stockpiles over existing or new utilities unless approval is granted by the OWNER/ARCHITECT or ENGINEER.

B. Provide positive drainage away from stockpile to prevent ponding or flooding of project area. Direct all drainage to temporary storm water facilities.

C. The topsoil and subsoil stockpile shall be sloped no steeper than 2H:!V and at a maximum height of eight (8) feet,

D. Provide silt fence around stockpile and immediately stabilize dormant stockpiles within seven (7) days per the specifications as shown on the projects Storm Water Pollution Prevention Plans. Dormant is considered any stockpile not actively used for more than thirty (30) days.

3.8 EXCESS MATERIAL

A. Dispose of extra or unsuitable topsoil or subsoil material off-site.

3.9 TOLERANCES

A. Excavations and Embankment work shall be performed and conform to the projects Grading Plan and if available cross sections and profiles. All work shall conform to the tolerances within this section. The CONTRACTOR shall understand and satisfy themselves as to the nature and distribution of the materials that they excavate.

B. The CONTRACTOR shall verify their work with templates, slope boards or other approved devices accepted by the industry and to the satisfaction of the OWNER/ARCHITECT or ENGINEER.

C. The following are the accepted tolerances that work shall conform to:

1. For cut and fill slopes deviations of ½ inch measured in a horizontal plane will not be permitted and will need corrective actions.

2. Shoulders and ditches, the horizontal measurements from the centerline shall not be less than the plan dimensions, and the elevations thereof shall not be higher than specified, but may vary not more than ½ inch below the established grades.

3. Subgrades surface shall in no location vary more than ½-inch from a ten foot straight edge applied to the surface parallel to the centerline of pavement, nor more than ½-inch form subgrade elevation established by construction layout stakes.

4. Finished Grade shall be installed within ½-inch from plan elevation shown on the Grading Plans.

3.10 CLEANING

1. Once finish grading has occurred leave all areas clean and raked, ready to receive grass seed or landscaping.

END OF SECTION 31 22 00

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SECTION 31 23 33 - TRENCHING AND BACKFILL

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the following.

1. Underground utility trench excavation and safety

2. Backfill materials and placement for underground utilities

3. Utility identification marking tape and trace wire

1.2 DEFINITIONS

A. Percent Compaction or Compaction Density: The field density of compacted material, expressed as a percentage of maximum dry density.

B. Field Dry Density of Field Density: In-place density as determined by ASTM D1556 (Sand Cone Method), ASTM D 2167 (Rubber Balloon Method), or ASTM D 6938 (Nuclear Method).

C. Maximum Dry Density: Laboratory density as determined by ASTM D698 (Standard Proctor) and occurring at the optimum moisture content of the soil being tested.

D. Pipe Embedment: Comprised of the following or combination of:

1. Foundation: Required only when the native trench bottom does not provide a firm working platform or the necessary uniform and stable support for the installed pipe.

2. Bedding: The zone between the bottom of trench and the bottom of pipe. Provides a firm, stable and uniform support of the pipe.

3. Haunching: Zone from the bottom of the pipe to the springline of the pipe.

4. Initial Backfill: From the top of the bedding or foundation layer to six (6) inches above the top of pipe, unless otherwise noted on the Construction Document trench details. Also, known as pipe cover.

5. Final Backfill: After the initial backfill or pipe cover to the final surface or the pavement subgrade.

6. Backfill: Both initial and final backfill.

1.3 SUBMITTALS

A. Provide material for pipe bedding, initial and final backfill including the following:

1. Name of Source

2. Location

3. Date of Sample

4. Sieve Analysis

5. Laboratory Compaction Characteristics

B. Where submittals review format, whether hard copy or software based, includes pre-determined language that includes the word "approved", the following shall apply:

1. "Approved" shall be defined as "Reviewed, No Exceptions Taken".

2. "Approved as Noted" shall be defined as "Reviewed, Exceptions as Noted".

1.4 QUALITY ASSURANCE

A. The CONTRACTOR shall compact all backfill material in accordance with the specifications of the pipe manufacturer.

B. The OWNER shall provide quality control acceptance field testing services of compacted backfill material, unless otherwise noted. The testing agency shall provide the OWNER/ARCHITECT and ENGINEER a letter certifying compaction results.

1.5 DELIVERY SOTRAGE AND HANDLING

A. If the trench detail calls for geotextile fabric it shall be protected from sunlight's ultraviolet rays during transportation and storage. Do not leave geotextile fabric exposed to sunlight's ultraviolet rays for more than five (5) days during installation.

B. Do not leave PVC piping exposed to sunlight's ultraviolet rays for more than five (5) days during installation, transportation, or storage.

PART 2 – PRODUCTS

2.1 BACKFILL MATERIALS

A. Trench bedding and Initial Backfill for the following pipes and fittings shall follow the pipe manufactures recommendations, the Trench detail shown on the Construction Documents. Where discrepancies occur Trench details on plan govern for material.

B. The following are pipe bedding and cover requirements:

1. Reinforced Concrete Pipe and Fittings

   a. Bedding shall consist of coarse interlocking aggregate No. 57, 6, 67, 68, 7, 78, or 8 stone for 60-inch or smaller pipe. For 66-inch or larger diameter pipe No. 4 aggregate may be used.

   b. Pipe Cover shall consist of compacted ASTM D Class I stone course interlocking aggregate No. 57, 6, 67, 7, 78, or 8 stone.

2. High Density Polyethylene (HDPE) Pipe and Fittings

   a. Bedding shall consist of coarse interlocking ASTM D2321 Class I aggregate No. 57 stone.

   b. Pipe Cover shall consist of compacted course interlocking ASTM D2321 Class I aggregate No. 57 stone.

3. Ductile Iron Pipe and Fittings

   a. Bedding shall be Select Granular Backfill (Spent core sand or foundry sand is strictly prohibited).

   b. Pipe Cover shall consist of compacted Select Granular Backfill (Spent core sand or foundry sand is strictly prohibited)

4. Polyvinyl Chloride (PVC) Pipe and Fittings

   a. Pipe bedding shall be No. 57, 6, 67, 68, 7, 78, or 8 stone.

   b. Pipe cover shall be No. 57, 6, 67, 68, 7, 78, or 8 stone.

5. Pavement Underdrain / Curb Drains

   a. ASTM No 57 Stone

C. Final Backfill (above pipe cover) shall consist of the following:

1. Premium Backfill where trenches fall underneath or within the zone of influence at a 1:1 slope of all pavement, concrete curbs and sidewalks or structures and shall consist of ODOT 304 Aggregate Base. The materials shall be well graded with no particles larger than two (2) inches and having a maximum gradation meeting the limits described in the ODOT specifications. The backfill shall be compacted in 6-inch lifts with equipment acceptable to the pipe manufacturer.

2. Regular backfill from trench may be used for all areas not under pavement. Suitable material may be Class I, II, III or excavated materials installed in maximum 8” lifts, 93% compacted. No rocks over 1-1/2” are acceptable in upper 8” of backfill.

2.2 EQUIPMENT

A. Compaction equipment shall be capable of consistently achieving the specified compaction requirements without damaging pipes.

2.3 UTILITY IDENTIFICATION

A. Tracer Wire: Continuous, single-stranded copper wire, insulated, maximum 10 AWG. Clear plastic covering, imprinted with inscription describing specific utility in large letters.

B. Detectable Warning Tape: acid-and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, minimum 6 inches wide and 5 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection. Tape shall be manufactured using a 0.8 mil clear virgin polypropylene film, reverse printed and laminated to a 0.35 mil solid aluminum foil core, and then laminated to a 3.75 mil clear virgin polyethylene film. Tape shall be printed using a diagonally striped design for maximum visibility, and meet the APWA Color-Code standard for identification of buried utilities. Detectable marking tape shall be Pro-Line Safety Products (or approved equal) and made in the USA., detectable by metal detector when tape is buried a maximum of 12” to 18” below grade; colored as follows:

1. APWA Uniform Color Codes

a. RED – Electric Power Lines, Cables, Conduit, and Lighting Cables.

b. YELLOW – Gas, Oil, Steam, Petroleum, or Gaseous Material.

c. ORANGE - Communication, Alarm or Signal Lines, Cables, or Conduit.

d. BLUE – Potable Water

e. GREEN – Sewers and Drain Lines (Tape shall indicate storm or sanitary)

f. WHITE - Proposed Excavation Limits or Route

g. PINK – Temporary Survey Markings, Unknown / Unidentified Facilities

h. PURPLE – Reclaimed Water, Irrigation, and Slurry Lines PART 3

PART 3 – EXECUTION

3.1 EXAMINATION

A. When the CONTRACTOR trenching operations encounter existing or abandoned underground storage tanks (UST’s), the operations shall be temporarily discontinued and notify the OWNER/ARCHITECT/ENGINEER. The OWNER/ARCHITECT/ENGINEER will contact an Environmental Engineer to

determine the disposition thereof and further direction provided.

B. When the CONTRACTOR trenching operations encounter remains of prehistoric people's site or artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and notify the OWNER/ARCHITECT/ENGINEER . The OWNER/ARCHITECT/ENGINEER will contact archeological authorities to determine the disposition thereof and further direction provided.

3.2 PREPARATION

A. As per Section 31 20 00, Earth Moving

3.3 SAFETY

A. Trench boxes or sheeting and shoring shall be used for trenches per OSHA specifications.

3.4 PROTECTION OF IN-PLACE CONDITION

A. As per Section 31 20 00, Earth Moving

3.5 RESTORATION

A. As per Section 31 20 00, Earth Moving

3.6 TRENCH EXCAVATION

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frostline, 48" unless noted otherwise by the Contract Documents.

C. Excavate trenches to uniform widths, in accordance with OSHA guidelines, to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

D. Trench bottoms: excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape sub-grade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench sub-grade.

1. For pipes and conduit less than 6 inches in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed sub-grade.

2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of

trench to support bottom 90 degrees of pipe circumference.

3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Preserve material below and beyond the line of excavation.

A. Locate all stockpile excavated trench material at least four (4) feet from edge of excavations and prevent cave-is or bank slides.

B. Remove rocks larger than six (6) inches or as required by plan notes, seal if required, and backfill with bedding material.

C. See Section 31 20 00, Earth Moving for additional requirements.

3.7 UNAUTHORIZED EXCAVATION

A. CONTRACTOR is responsible for backfilling unauthorized excavations.

B. Unauthorized excavations which extend to and expose rock will be sealed with at least six (6) inches of LSM, concrete, or sprayed with bitumen within eight (8) hours of exposure. If sealing is delayed more than eight 8 hours, over excavate at least six (6) inches below the bottom to expose the fresh rock and seal within six (6) hours.

3.8 BACKFILL

A. CONTRACTOR is responsible to obtain all inspections and approvals for trench and pipe installation.

B. All trenches and excavations shall be backfilled as soon as practical after the pipe has been installed unless other protection of the pipe is directed or shown on the plans.

C. Coordinate backfilling with utilities testing.

D. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

E. The backfill around the pipe up to the top of pipe shall be placed in loose layers not exceeding six (6) inches per layer and thoroughly compacted by hand or power tampers approved by the ARCHITECT or ENGINEER. Great care shall be sued to obtain thorough compaction under the haunches and along the side of pipes. Over the top of pipe, backfill layers of approximately eight (8) inch depth shall be added with each layer compacted separately and thoroughly until the trench is completely a uniformly filed to a depth of two feet above the top of the pipe.

F. Backfilling against pipe structures, whose joints involve the use of cement mortar or other concrete, or where buttresses are constructed, shall not be done until mortar has set at least 12 hours.

G. Compaction over one foot above the pipe shall be done with approved mechanical tampers. Compaction density be per the pipe manufacture specifications.

H. Backfill materials shall be brought up evenly by depositing the material in layers approximately eight (8) inches in loose depth and without damaging the pipe by shock, jar or excessive free fall. Each layer shall be thoroughly compacted by power tampers operated with care so as to not to damage the underlying pipe or appurtenances. Hand tampers may be sued in corners or narrow places inaccessible to power tampers. If compaction is done using hydraulically-operated backhoe mounted compactors with minimum rated impulse force of 6,400 pounds with a minimum 2,0000 cycles per minute, the backfill material may be deposited in layers not more than two (2) feet in loose depth. Layers in excess of two feet may be deposited only if tests, conducted at the CONTRACTOR'S expense, show, to the satisfaction of the ARCHITECT and ENGINEER that the specified degree of compaction is being achieved. There shall be at least three feet of compacted backfill over the pipe before this method of compaction may be employed.

I. For all areas not under pavement, sidewalks and curbs the backfill shall be compacted to 90% of the maximum dry density at +/-2% of optimum moisture content as determined by tests approved by or conducted by the ARCHITECT/ENGINEER. Backfill shall be compacted to not less than 98% of the maximum dry density at +/-2% of optimum moisture content for areas under pavement, sidewalks and curbs.

J. Backfill shall be kept completed up to a point within 100 feet of the end of the newly installed pipe unless directed by the ARCHITECT or ENGINEER. During backfill operations, no sheeting or shoring shall be removed without permission from the ARCHITECT or ENGINEER.

K. Backfill trench to the pavement subgrade or the finished grade less topsoil.

L. Provide 4 inch thick, concrete-base slab support for piping or conduit less than thirty (30) inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway sub-base.

M. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom offootings with approval of ENGINEER.

N. Place backfill as to not disturb or damage nearby work or facilities.

O. Maintain all fill materials within two (2) percent of optimum moisture, to attain required compaction density.

P. Place and compact material in equal continuous layers.

Q. Maximum compacted depth is six (6) inches for aggregate material and eight (8) inches for soil materials, unless shown differently in the plans.

R. Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

3.9 COMPACTION

A. As per Section 31 20 00, Earth Moving.

3.10 UTILITY IDENTIFICATION

A. Install marking tape over all site utilities, twelve (12) inches below finish grade or as shown on the Trench Details in the plans. Install six (6) inches below subgrade under pavements and slabs.

B. Install tracer wire at top center of parking tape; pull wire taut to remove slack.

C. Extend tracer wire to utility boxes, manholes, hand holes, and junctions etc. to allow for connection to subsurface location equipment.

3.11 FIELD QUALITY CONTROL AND ASSURANCE

A. General

1. The CONTRACTOR shall perform field quality control tests separate from acceptance testing. CONTRACTOR test results will not be used by the OWNER/ARCHITECT or ENGINEER for acceptance.

2. Field density testing for quality assurance shall be done in accordance with ASTM D1556, STM D2167, or ASTM D6938.

3. Compaction tests shall be deemed to comply with specifications when no more than one (1) test of any three (3) consecutive tests performed falls below the specified relative compaction. The one test shall be no more than three (3) percentage points below the specified compaction. The CONTRACTOR shall pay for the costs for any retesting or additional work not conforming to these specifications.

4. Where compaction tests indicate a failure to meet he specified compaction, the ARCHITECT/ENGINEER/CONTRACTOR take addition tests in each direction until the extent of the failing area is identified. Rework the failed area until the specified compaction has been achieved.

B. COMPACTION

1. Material shall be placed and compacted in layers until the dry density is not less than the percentage of maximum dry density indicated in the tale below determined by ASTM D698

Max Lab Dry Wt. (lbs/ft3)	Min. Compaction Requirements (% Lab Max.)
90 to 104.9	100
105 to 119.9	98
120 or more	95

2. The OWNER/ARCHITECT or ENGINEER will evaluate field density test results in relation to maximum dry density as determined by testing the material in accordance with ASTM D698 (Standard Proctor).

3. Location of field density tests shall be determined by the OWNER/ARCHITECT and ENGINEER.

4. Minimum frequency of the field density tests shall be as follows:

   A. Under pavement, sidewalks, curbs, other structures: 1 per lift for every 150 lineal feet of trench.

   B. Not under pavement, sidewalks, curbs, other structures: 1 per alternate lift for every 250 lineal feet of trench.

   C. If requested by the OWNER/ARCHITECT or ENGINEER, the contractor shall take more frequent tests.

3.12 SHRINKAGE

A. Backfill trench to a height to allow for the shrinkage or consolidation of the backfill material over time.

B. If backfill settles over trenches prior to subgrade work install additional backfill to level off areas.

END OF SECTION 31 23 33

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SECTION 31 32 19 – GEOTEXTILE FABRIC

PART 1 - GENERAL

1.1 WORK INCLUDES

A. Work included in this section relates to all geotextile fabric materials, and appurtenances related to installation.

1.2 SUBMITTALS

A. Submit shop drawings prior to ordering materials for approval.

B. Shop drawings: include product material information for the following:

1. Geotextile Fabric

   a. Test results of physical properties.
   b. Affidavit certifying that the raw and roll material tests results are submitted are accurate and meet the specification requirements.
   c. Manufacturer’s installation instructions.
   d. Subgrade Stabilization design recommendations by the manufacturer.

1.3 DELIVERY, STORAGE, AND HANDLING

A. During shipment and storage, wrap the fabric in a heavy-duty protective covering to protect it from UV deterioration, temperature over 140 degrees Fahrenheit, direct sunlight, mud, dirt, dust, and other debris.

B. Geotextile labeling, shipment and storage shall follow ASTM D 4873.

C. Handle and store geotextile fabric according to manufacturer's moving and storage instructions.

D. Handle and unload by hand, or with load carrying straps, a fork lift with stringer bar or axial bar. Fabric shall not be lifted by chains, cables or dropped on ground.

1.4 QUALITY ASSURANCE

A. Comply with the requirements of authorities having jurisdiction and manufacturer’s requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. All manufacturers are subject to compliance with requirements, specifications, and construction details, and must demonstrate compliance through appropriate test and documentation.

2.2 GEOTEXTILE FABRIC

A. Furnish fabric composed of strong rot-proof polymeric fibers formed into a woven or non-woven fabric. Products must be tested by the National Transportation Product Evaluation Program (NTPEP). The Department will determine acceptance of Type A, B, C and D fabric according to data obtained in the most current NTPEP report - Laboratory Results of Evaluations on Geotextiles and Geosynthetics. The NTPEP testing results must meet or exceed the requirements listed in Table 712.09-1. For all tests except Ultraviolet Exposure, the products Minimum Average Roll Values (MARV), as published in the NTPEP report, must also meet or exceed the requirements listed in the table. If no MARV value is published in the NTPEP report, the manufacturer must submit to the Department certified test data showing the MARV values for the product will meet or exceed the requirements listed in Table 1 below. All minimum strengths shown are in the weakest principal direction.

B. For Type E material, supply fabric conforming to the requirements of AASHTO M288, Section 10, Table 8. The Owner or Engineer will accept Type E material based on certified test data.

C. Ensure that the fabric is free of any treatment that might significantly alter its physical properties.

TABLE 1

PROPERTY	TEXT METHOD	REQUIRED VALUES	
Type A: Underdrains and Slope Drains			
Minimum tensile strength	ASTM D 4632	80 lb	355 N
Minimum puncture strength [1]	ASTM D 6241	140 lb	625 N
	or ASTM D 4833	25 lb	110 N
Minimum tear strength	ASTM D 4533	25 lb	110 N
Apparent opening size	ASTM D 4751		
Soil Type-1: Soils with </= 50% passing No. 200 (75 m) sieve		AOS ≤ 0.6 mm	
Soil Type-2: Soils with 50-85% passing No. 200 (75 m) sieve		AOS ≤0.3 mm	
Minimum permittivity	ASTM D 4491	0.5 sec-1	
Type B: Filter Blankets for Rock Channel Protection			
Minimum tensile strength	ASTM D 4632	200 lb	890 N
Minimum elongation	ASTM D 4632	15%	
Minimum puncture strength [1]	ASTM D 6241	440 lb	1955 N
	or ASTM D 4833	80 lb	355 N

Minimum tear strength	ASTM D 4533	50 lb	220 N
Apparent opening size	ASTM D 4751	AOS ≤ 0.6 mm	
Minimum permittivity	ASTM D 4491	0.2 sec-1	

Type C: Sediment Fences

Minimum tensile strength	ASTM D 4632	120 lb	535 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength [1]	ASTM D 6241	275 lb	1225 N
	or ASTM D 4833	50 lb	220 N
Minimum tear strength	ASTM D 4533	40 lb	180 N
Apparent opening size	ASTM D 4751	AOS ≤ 0.84 mm	
Minimum permittivity	ASTM D 4491	0.01 sec-1	
Ultraviolet exposure strength retention [2]	ASTM D 4355	70%	

Type D: Subgrade-Base Separation or Stabilization

Minimum tensile strength	ASTM D 4632	180 lb	800 N
Maximum elongation	ASTM D 4632	50%	
Minimum puncture strength [1]	ASTM D 6241	385 lb	1715 N
	or ASTM D 4833	70 lb	310 N
Minimum tear strength	ASTM D 4533	70 lb	310 N
Apparent opening size	ASTM D 4751	Same as Type A	
Permittivity	ASTM D 4491	0.05 sec-1	

Type E: Pavement Reinforcement Fabric
AASHTO M 288, Section 9, Table 7

Underground Storm Water Chambers
(Non Woven)

Minimum tensile strength	ASTM D 4632	160 lb
Maximum elongation	ASTM D 4632	50%
Minimum puncture strength [1]	ASTM D 6241	410 lb
Minimum trapezoidal tear strength	ASTM D 4533	60 lb
Apparent opening size	ASTM D 4751	70 mm
Permittivity	ASTM D 4491	1.5 sec-1
Water Flow	ASTM D 4491	110 gpm/ft2

Notes:

1. ASTM D6241 is now the standard puncture resistance test required by AASHTO and NTPEP. NTPEP will continue to publish product data, tested under ASTM D4833, until the product is retested under ASTM D6241.
2. Provide certified test data to the Department. Include strength retention data at 0, 150, 300, and 500 hours

2.3 ENGINEERING GEOGRID MATERIAL

A. Biaxial polymer grids will be manufactured from 100% polypropylene; such as Tensar BX1200 and/or BX1300 as manufactured by the Tensar Corporation, 1210 Citizens Parkway, Morrow, Georgia 30260 (Phone 1-800-843-8417) or an approved equal

2.4 EROSION CONTROL BLANKETS

A. Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long. Install in detention basin per manufactures recommendations.

2.5 EROSION-CONTROL FIBER MESH:

A. Biodegradable twisted jute or spun-coir mesh, a minimum of 0.92 lb. /sq. Yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long. Install on slopes greater that 1 Vertical to 3 Horizontal or areas subject to erosion in order to stabilize site.

PART 3 - EXECUTION

3.1 GEOTEXTILE FABRIC CONSTRUCTION METHOD

A. When specified, place the geotextile fabric at the bottom of the cut or at locations designated in the construction plans and as directed by the Owner or Engineer.

B. Place the geotextile fabric smooth and free of tension or wrinkles.

C. Fold or cut the geotextile fabric to conform to curves.

D. Overlap a minimum of 18 inches at the ends and sides.

E. Hold the fabric in place with pins or staples.

F. Place the suitable material on the fabric and do not operate the equipment directly on the fabric.

G. Unless stated otherwise, spread the suitable material and maintain a minimum lift thickness of 12 inches.

3.2 ENGINEERING GEOGRID CONSTRUCTION

A. Geogrid shall be laid at the proper elevation and alignment as shown on the plans and shall be oriented such that the roll length runs parallel to the trench.

B. Geogrid sections shall be overlapped as shown in the plans or as directed by the CMT. Minimum overlap in horizontal plane shall be three feet. In vertical plane the minimum overlap shall be nine inches. Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction. Placement of geogrid around curves or corners will require cutting of geogrid product and diagonal overlapping of same to ensure that excessive buckling of grid material does not occur.

C. Specified granular fill material shall be placed in lift thicknesses and compacted as indicated on the plans and in accordance with Item 203 Aggregate Refill for subbase application and Section 312300, Excavation and Fill, for slag or limestone for trenches. Care shall be taken to assure that the geogrid is held in desired position during and after placement of granular fill.

D. No construction equipment shall operate directly upon the geogrid. A minimum fill thickness of six inches is required prior to operation of any vehicles over the geogrid. Sudden braking or sharp turning shall be avoided while operating any equipment on reinforced fill.

END OF SECTION 31 32 19

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SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work included in this section pertains to all materials, equipment, finishing methods, installation, striping, symbols, etc. that relate to flexible paving.

1.02 DEFINITIONS

A. ODOT: Ohio Department of Transportation Construction and Materials Specifications (most current edition).

1.03 APPLICABLE SPECIFICATIONS

A. The following standards form a part of these specifications:

1. The American Society for Testing Materials Standards (ASTM):

   a. C 29 Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate.
   b. C 127 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
   c. D 75 Standard Practice for Sampling Aggregates.

2. ODOT standard specifications (latest edition):

   a. Section 304 - Aggregate Base.
   b. Section 441 - Asphalt Concrete - Mix Design and Quality Control.
   c. Section 407 - Tack Coat.
   d. Section 412 - Crack Sealing Asphalt Pavements.
   e. Section 418 - Asphalt Pavement Joint Adhesive.
   f. Section 633 Conditioning Existing Pavement Prior to Hot Mix Asphalt (ASPHALT) Overlay
   g. Section 635 - Cleaning and Preparation of Pavement Surfaces for Pavement Markings.
   h. Section 640 - Pavement Markings.
   i. DELETED

1.04 SYSTEM DESCRIPTION

A. Provide hot mix asphalt paving according to materials, workmanship, and other applicable requirements of standard state specification.

B. Special Conditions

1. Protection of work in place

    a. All paving work shall be protected from construction traffic at all times after completion. All damaged work shall be replaced with no additional payment.

1.05 SUBMITTALS

A. Quality Assurance / Control Submittals:

1. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
2. Job-Mix Designs: Certification by authorities having jurisdiction, of approval of each job mix proposed for the Work:

    a. Certification: Provide material certificates signed by the material producer and the CONTRACTOR, certifying that each mixture does not contain ferrous material or ferrous minerals of any kind.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

B. Asphalt testing service: OWNER will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes (if required by the OWNER).

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the ODOT Construction Materials and Specifications for asphalt paving work, except where modified, changed or added to in this specification:

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to the Section.

D. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:

    a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
    b. Review condition of subgrade and preparatory work.
    c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
    d. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment and facilities needed to make progress and avoid delays.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Asphalt shall be delivered to the site per ODOT requirements and maintain asphalt temperature to apply at the temperatures called for in Section 401.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Asphalt is to be delivered and installed at required temperature per mix design.
2. Asphalt trucks are to be tarped and properly insulated during cold weather conditions (less than 50 degrees F.
3. If the distance of hauling asphalt exceeds 20 miles insulate truck beds to maintain workable temperatures and covers are fastened against the wind.
4. Do not exceed a 50 mile distance hauling asphalt from the plant unless approved by the engineer and a written guarantee by the asphalt manufacture that the integrity of the asphalt delivered to the site will meet ODOT requirements for installation.
5. In no case shall more than 90 minutes elapse from loading the asphalt mixture on the truck to discharge into the spreading equipment.
6. The CM/OWNER of ENGINEER has the right to reject and send back any mix design that does not meet the required asphalt delivered temperature at the time of spreading at no cost to the owner for loss of material.
7. Temperature required for paving material component will determine temperature required for scheduled paving operation.
8. No mixture shall be spread when the subbase is wet or when other conditions prevent proper spreading, finishing or compaction.
9. Tack Coat: Comply with minimum atmospheric and surface temperature of course to be installed.
10. DELETED
11. ODOT 301 - Asphalt Temperature: Minimum air temperature for placement based on nominal compacted lift thickness is 40 degrees F. The minimum mixture temperature when delivered to the paver is 250 °F (120 °C). When using warm mix asphalt the minimum temperature is 230 °F (110 °C). The mixture temperature should be checked at a minimum, 4 times per day and more if required. The temperature should be documented in the project records
12. ODOT 441 - Asphalt Temperature: Minimum surface temperature for placement based on nominal compacted lift thickness as follows per ODOT Section 401.06.

    a. 36 degrees F and rising at time of placement (greater than 3 inch). If paving on aggregate or subgrade use air temperature of 40 degrees F or higher.
    b. 40 degrees F and rising at time of placement (1.5 to 2.9 inches).
    c. 50 degrees F and rising at time of placement (1.0 to 1.4 inches).
    d. 60 degrees F and rising at time of placement (less than 1.0 inch).
    e. 40 degrees F and rising at time of placement (variable Intermediate Course, 0 to 3.0 inches).
    f. In addition to the above surface temperatures requirements do not place surface courses if the air temperature is less than 40 degrees F.

13. Surface temperature measurements should be taken using the following procedures:

    a. When taking a reading in the sun, place the thermometer on the pavement and then shade that area with a clipboard, cardboard, or other available shading material. Then take the temperature reading after approximately 3 minutes. The intent is not to shade the area to allow it to cool, but to protect the thermometer from obtaining a false reading due to direct exposure to the sun.
    b. The surface temperature should not be taken under the only shade tree or at the only sunny (unshaded) spot on the project. The surface temperature should be taken at a representative area.
    c. The surface temperature should be taken in the lane to be paved and not the adjacent berm.
    d. On Portland cement concrete pavements where flexible repairs have been performed, the surface temperature of the Portland cement concrete will be the governing temperature.
    e. A new surface temperature should be taken when the existing pavement surface material changes (asphalt concrete to port land cement concrete or vice versa) to ensure that the new surface meets the minimum temperature specification. If this specification is not met, paving operations must be discontinued until the surface reaches specification temperature. Paving operations may be moved to a different area of the project where the surface meets minimum specification temperature

~~**14. Seasonal limitation, place asphalt surface course between May 1st and October 31st. When placing surface course outside of seasonal limitations, provide a limited warranty against defects in such work.**~~

15. During a rain event, a load of material in the process of being dumped into the paver may be placed, with the requirement that the rollers follow closely behind the paver and a construction joint is formed at the end of the run. Do not allow waiting trucks to be to be dumped and placed. The material in the waiting trucks will retain sufficient heat for proper placing and compacting for an hour or more depending on the ambient temperature. Water can be kept from accumulating on the covers of the trucks and draining into the asphalt mixture by raising the truck beds slightly. These loads may be placed when conditions improve if the asphalt temperature is acceptable and the surface being paved is in a reasonably dry condition.
16. Asphalt delivery trucks are not allowed to clean out truck beds on the pavement that will be paved. The material that remains in truck beds is cold, will not compact correctly often causing a bump in the pavement and likely a future pot hole. Spreading or broadcasting the cold material across the pavement prior to paving does not solve the problem. The contractor shall designate a cleanout area and ensure truck drivers are using it.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregate base shall be in accordance with ODOT Item 304 Aggregate Base. The following materials are prohibited: Slag, crushed ACBFS, granulated slag, open hearth slag or steel slag.

B. Asphalt Base Course shall be ODOT Item 301 - Asphalt Concrete Base

C. Intermediate course shall be in accordance with ODOT 441 - Asphalt Concrete Intermediate Course, Type 2, PG 64-22 (448)

D. Surface course shall be in accordance with ODOT 441 - Asphalt Concrete Surface Course, Type 1, PG 64-22 (448)

E. Gutter sealer shall be in accordance with ODOT CMS 705.04.

F. Tack coat shall be in accordance with ODOT Item 407 - Tack Coat.

G. The OWNER will engage the services of a testing laboratory to insure compliance with all specifications.

H. Recycled Asphalt is permitted provided that it meets ODOT specifications Section 401 and does not exceed the limits of Table 401.04. Recycled Asphalt Shingles (RAS) are prohibited.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck loaded with at least 20 tons of material.
3. Excavate soft spots, unsatisfactory soils, and area of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF COMPACTED AGGREGATE BASE

A. The entire area to receive compacted aggregate shall be proof rolled with a tandem dump truck loaded with at least 20 tons. The proof rolling shall be executed prior to installing the compacted aggregate. All soft and yielding areas shall be repaired.

1. The acceptable observed subgrade deflection shall be 1/2 inch or less measured at the rear tire in the cross section perpendicular direction to traffic direction using a 10-foot straight-edge and 3/8 inch or less measured at the rear tire in the parallel direction of traffic using a 10-foot straight-edge.

B. Compacted aggregate shall be installed immediately after acceptance of the subgrade proof roll operation by the soils engineer and Engineer.

1. The subgrade shall be repaired and the proof roll operation repeated if approved subgrade is disturbed by construction traffic, rain or other circumstance prior to placing the compacted aggregate.
2. The proof roll operation shall be repeated in the event the subgrade is left exposed for 3 work days or more prior to placing the compacted aggregate.
3. No not spread on frozen surfaces or use frozen material.

C. Place the aggregate material in accordance with applicable sections of the Ohio Department of Transportation CMS and as hereinafter specified.

D. Aggregate material shall be compacted to thickness indicated on the Drawings. Each lift shall be compacted with approved rollers to no less than 100 percent of the maximum dry density as determined by Method C of AASHTO T99, as modified in Article 2.03.24.

E. Do not exceed a compacted lift thickness of:

1. 8 inches when using vibratory rollers greater than 12 tons.
2. 6 inches with vibratory rollers weighing 10 to 12 tons.
3. 4 inches with no vibratory roller. If the contractor is compacting with a vibrating plate compactor, the maximum lift thickness is 4 inches. If the contractor is compacting with a roller without any vibration, the maximum lift thickness is 4 inches.
4. Can use a lighter roller with equivalent centrifugal force.
5. Centrifugal force is the weight with vibration.
6. Contractor needs to document the roller weight requirements are met.

F. Place in equal lifts when the specified thickness exceeds 8 inches.

1. Example: if 12-inch lift is specified, place in two 6 inch lifts

G. All compacted aggregates for all bituminous pavements shall be install in multiple lifts, as indicated on the drawings.

H. Grade Control: During construction maintain lines and grades, including crown and cross-slope of compacted aggregate course.

3.03 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving. Existing surfaces to receive asphalt must be clean prior to the installation of any portion of the work. Clean the surface on which the asphalt concrete is to be placed and keep it free of accumulations of materials that would, in the judgment of the OWNER/ CM/ ENGINEER, contaminate the mixture, prevent bonding or interfere with spreading operations. Methods used may include but not be limited to the use of a sweeper that can wet and vacuum the area free of dirt and debris, clay, and dust, or any other foreign material.

B. Repair pavement failures and perform crack repair according to their respective specification requirements prior to installation of any asphalt surface course.

C. Cold-milling and/or grinding may be necessary to ensure that the asphalt edges at concrete abutments such as approaches, sidewalks, curbing, and drainage basins have smooth transitions. Butt mill at transitions to existing pavement.

D. After site review, detail whether wedge milling is necessary to assure positive drainage and transition. Install leveling course, if required, on the project per the site details and quantities shown on the plan sheets.

E. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat. Bad oil spills may require removal with a wire brush or other suitable tool. Maintain clean pavements prior to applying emulsified tack coat. When approved sub-grade or pavement coursed previously constructed under the Contract become loosened, rutted, or otherwise defective, the CONTRACTOR must correct the deficiency according to the contract item or items involved before the spreading of a subsequent pavement course.

F. Placement shall not occur when weather is inclement. The forecast shall be for rising temperatures for all paving efforts.

G. Detail and submit to the OWNER/ CM/ ENGINEER a paving plan on the site plan sheet prior to placement of asphalt.

H. Trucks shall have smooth, clean, and tight metal beds that do not have mixture sticking to the truck bed and from which the entire quantity of asphalt can be discharged smoothly into the spreading equipment. Trucks shall have a tarp and insulation as needed to protect mixture from wind, rain, and cold temperatures. Trucks for hauling asphalt mixture shall be in good, safe working condition. Tarp shall be fastened to truck to protect against wind.

I. Surface course longitudinal joints shall run with the traffic pattern. Therefore, pulling across the driving lanes shall not be allowed unless express permission is given by the OWNER/CM.

J. The entire parking lot surface course shall be paved on the same day. The timing and process should be discussed with and approved by the OWNER/ CM/ ENGINEER before proceeding with the work.

K. Paving Equipment must be capable of placing, spreading, and finishing courses of asphalt to the specified thicknesses. Asphalt shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging. Auger extensions are required if segregation occurs while pavers are extended beyond the basic screed width. Hand work shall be minimized to ensure the best possible finished surface.

3.04 TACK COAT

A. Ensure surface is thoroughly clean and dry.

B. The tack coat contained in the distributor tank shall be homogeneous.

C. The tack coat shall be applied to a prepared clean pavement. Material shall be applied uniformly across the width of the designated area. Partial coverage installations are NOT acceptable

D. The tack coat shall not be applied on a wet pavement surface or when the pavement surface temperature is below the requirements shown for asphalt.

E. Tack / Prime Coat Distributor Truck must have an insulated tank, heating system and a distributor capable of maintaining a uniform application of emulsified asphalt under pressure throughout the area to be paved. This requires a pump in good working order, full circulating spray bars, and free flowing nozzles. Small, isolated areas may be tacked with a wand.

F. Tack coat is to be applied uniformly across the entire surface to be paved without streaking. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

G. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

TYPICAL TACK COAT APPLICATION RATES

Surface Type	Application Rate (gal/yd2)
New Asphalt	0.05 to 0.06
Oxidized Asphalt	0.08 to 0.09
Milled Asphalt Surface	0.08 to 0.09
Milled PCC Surface	0.06 to 0.08
PCC Surface	0.06 to 0.08

3.05 ASPHALT PLACING

A. Machine place asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix shall be mechanically tamped. Place each course to required grade, cross section, and thickness when compacted.

1. Place asphalt base course in number of lifts and thicknesses indicated. The following are maximum lift thicknesses:

MINIMUM / MAXIMUM LIFT THICKNESSES

Item	Min Lift	Max Lift	Taper to 0” *	Uniform Thickness Required
301 Asphalt Concrete Base	3”	6”	No	No
302 Asphalt Concrete Base	4”	7.75”	No	No
441 Asphalt Concrete Surface Course, Type 1 (448)	1”	1.5”	No	No
441 Asphalt Concrete Intermediate Course, Type 1 (448)	1”	1.5”	Yes	No
441 Asphalt Concrete Intermediate Course, Type 2 (448)	1.75”	3”	Yes	No

2. Place asphalt surface course in single lift.

3. Spread mix at minimum temperature of 250 to 275 degrees F. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls, and tears in asphalt paving mat.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
2. When placing the asphalt course do not place joint for paving pass/strip over the same joint as the previous asphalt course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

D. Special Conditions

1. Fenced areas: All fence fabric shall be removed from poles prior to paving fence areas.
2. The paving machine shall not be allowed to track over or back track over any finished course of freshly placed bituminous mixture while the mixture is still hot or warm. Tracking the paving machine over freshly placed bituminous courses shall render that section of pavement unacceptable. All unacceptable pavements shall be removed and replaced with no additional payment.

3.06 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 24 inches.
3. Offset transverse joints, in successive courses, a minimum of 24 inches.
4. Construct transverse joints at each point where paver ends a day’s work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.07 COMPACTION

A. General: Begin compaction as soon as placed asphalt paving will bear roller weight without excessive displacement. Compact asphalt paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers. Equipment per ODOT Section 410.12.

1. The Job Mix Formula (JMF) provides the optimal compaction temperature for the design. The mixture should be checked frequently to ensure the asphalt is being compacted at, or near that temperature. For asphalt concrete base pavements refer to Items 301 and 302 for minimum allowed mix temperature. In all cases the mixture should not be allowed to cool below a workable temperature for adequate compaction (175° F to 275° F) and the majority of compaction should be accomplished before the temperature reaches 225° F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to Comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while asphalt is still hot enough to achieve specified density. Continue rolling until asphalt course has been uniformly compacted to the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.08 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the tolerances specified in ODOT Section 401.19.

1. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot (3-m) straightedge applied transversely or longitudinally to paved area. Longitudinal and transverse slopes indicated within the tolerances specified in ODOT Section 401.19.

2. DELETED

3.09 FINAL ACCEPTANCE CRITERIA FOR HEAVY AND STANDARD DUTY PAVING

A. Acceptance Submittals

1. No bituminous pavements will be accepted until it has been demonstrated by the CONTRACTOR that the pavements are in accordance with the Drawings and Specifications. The CONTRACTOR shall submit the following:

   a. Job mix formula from a state approved / certified asphalt manufacturing facility for each type of bituminous mixture. The job mix formula shall contain, at minimum, the aggregate gradation, percent bitumen, source and type of bitumen and the laboratory maximum compacted density for the mixture.

B. Variation from Job Mix Formula or Required Gradations:

1. Calibrated equipment and qualified personnel must always be accessible during the construction of this ASPHALT. The CONTRACTOR shall provide the necessary equipment, materials, and labor to complete the job acceptable to the OWNER/CM. Variations in the size and amount of equipment will depend on the size of the area being paved.
2. It is imperative that all documents list a 'Person-in-Charge' who is responsible for the over-site of the previously listed activities. This individual will be the point of contact for the OWNER/CM and they shall work with the OWNER/CM to ensure timely project completion and specification compliance. This individual shall be knowledgeable in all aspects of asphalt design, production, and installation and shall be an employee of the company holding the contract with the OWNER/CM, even if the ASPHALT is being produced and supplied by a separate vendor.
3. Daily maximum theoretical specific gravity values must be made available to the CONTRACTORs density technician for verifying in-place density within four hours of start of production.
4. Asphalt content, gradation, and bulk specific gravity (Gmb) testing shall be done a minimum of once every 400 tons of asphalt supplied or every third day for low tonnages that when added together successively do not equal 400 tons.
5. Acceptable average measures are made by use of a correlated nuclear density gauge, Pavement Quality Indicator or PaveTracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed.
6. Any average in-place density measure for surface course mixtures that is less than required for the day will result in a reduction in asphalt pay equal to the following chart. After reaching the 30% reduction mark the pavement shall be removed and replaced by the CONTRACTOR or left in place with no compensation due the CONTRACTOR. Base and leveling installation of asphalt shall meet local DOT specifications for in-place density measures. Surface course longitudinal joints shall be measured 6" from the joint, centered upon core or density gauge, and shall meet the mat density requirements minus 2.0% at a minimum. Base and leveling course longitudinal joint density measures shall achieve between 95% - 100% of maximum achievable individually, with an average of 98% on any given day.
7.

In-Place Density Pay Schedule, Surface Course Mat Density

Pay Factors, % (percent)	In-Place Density, % Maximum Theoretical Specific Gravity, Gmm
100	> 92.0%
100 - 0.5 for each 0.1% below 92.0%	91.0% to 92.0%

95 - 1.0 for each 0.1% below 91.0%	90.0% to 91.0%
85 - 1.5 for each 0.1% below 90.0%	89.0% to 90.0%

8.
9. Process Control testing shall be in accordance with state standards for frequency and methods where the work being performed is done with a minimum of testing meeting the above QC requirements.
10. Protect the asphalt until such time that traffic can be placed upon the properly compacted asphalt and show no signs of deformation.

3.10 SITE SPECIFIC IDENTIFICATION

A. Remove and store bumper blocks and other lot accessories during operations, reinstall after work is completed, and replace any and all broken bumper blocks.

B. Remove all waste materials from the site and dispose of according to local ordinances.

C. Complete all work in compliance with ADA requirements.

D. Supply OWNER/CM with Notarized Certificate of Compliance and total (tons, cu. yds., number) used for all products supplied to the project for each pay item.

E. Supply OWNER/ CM/ ENGINEER with yield calculations for all products used on the project. (Example: placement of 1,300 sq. yds. of Asphalt, 1-3/4" compacted thickness will require 128 tons when the unit weight = 150 pcf.)

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow milled materials to accumulate on-site.

END OF SECTION 321216

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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Work included in this section pertains to all materials, equipment, finishing methods, installation etc. that relate to rigid paving.

B. This section includes exterior cement concrete pavement for the following:

1. Driveways and Roadways
2. Curbs and Gutters
3. Walkways
4. Curb Ramps
5. Dumpster Area(s)

1.02 DEFINITIONS

A. Cementitious materials: Portland cement alone or in combination with one or more of the following blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, silica fume, and air cooled blast furnace slag.

1.03 SUBMITTALS

A. Product data for each type of manufactured material and product indicated:

B. Design mixes: for each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material test reports: from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. ODOT Section 499 Concrete General
2. ASTM C 33 – Standard Specification for Fine and Concrete Aggregate
3. ASTM C 39 – Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C 94 – Ready Mix Concrete
5. ASTM C 873 – Compressive Strength of Concrete Cylinders Cast In Place in Cylindrical Molds

D. Material certificates: signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials and aggregates.
2. Steel reinforcement and reinforcement accessories.

3. Admixtures.
4. Curing compounds.
5. Joint fillers.

1.04 QUALITY ASSURANCE

A. Installer qualifications: an experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer qualifications: manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the national ready mix concrete association's plant certification program.

C. Testing agency qualifications: an independent testing agency, acceptable to the [OWNER] [CM], qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

D. Source limitations: obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI publications: comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete testing service: The OWNER will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixes.

1.05 PROJECT CONDITIONS

A. Traffic control: maintain access for vehicular and pedestrian traffic as required by Owner and Engineer for other construction activities.

B. Don’t not place pavement when base surface or ambient temperature is less than 40 deg F, or base is wet or frozen.

PART 2 - PRODUCTS

2.01 FORMS

A. Form materials: plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves of a radius 100 feet or less.

B. Form-release agent: commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 STEEL REINFORCEMENT

A. Plain-steel welded wire fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-steel welded wire fabric: ASTM A 497, flat sheet.

C. Epoxy-coated welded wire fabric: ASTM A 884/A 884M, class A coated, plain steel.

D. Reinforcement bars: ASTM A615/A 615M, grade 60, deformed (carbon steel bars).

E. Epoxy-coated reinforcement bars: ASTM A 775/A 775M; with ASTM A 615/a 615M, grade 60, deformed bars.

F. Steel bar mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, grade 60, deformed bars; assembled with clips.

G. Plain steel wire: ASTM A 1064/A 1064M-16b, as drawn.

H. Joint dowel bars: plain steel bars, ASTM A 615/A 615M, grade 60. Cut bars true to length with ends square and free of burrs.

I. Epoxy-coated joint dowel bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, grade 60, plain steel bars.

J. Tie bars: ASTM A 615/a 615M, grade 60, deformed.

K. Bar supports: bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer coated wire bar supports and chairs adequate to support weight of concrete, installers, and prevent displacement or misalignment.

L. Epoxy repair coating: liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.

2.03 CONCRETE MATERIALS

A. General: use the same brand and type of cementitious material from the same manufacturer and supplier throughout the project.

B. Portland cement: ASTM C 150, type I OR II.

1. Type I is restricted to fresh water and low sulfate soil areas
2. Type II is to be used in high sulfate areas and areas subject to high salt concentrations, typically associated with salt water areas and pavement subject to use of deicing salts.
3. Fly ash: ASTM C 618, class F or C.

C. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

1. Class Designation: 4S, 4M, or 1N (pavement, walks etc., severe weathering regions).
2. Maximum aggregate size: 3/4 inch nominal.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

D. Water: ASTM C 94.

2.04 ADMIXTURES

A. General: admixtures certified by manufacturer to contain not more than 0.1 percent water- soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-entraining admixture: ASTM C 260.

C. Chemical Admixtures for concrete (with Engineer approval):

1. Water-reducing admixture: ASTM C 494, type A.
2. Water-reducing and retarding admixture: ASTM C 494, type D
3. Water-reducing and accelerating admixture: ASTM C 494, type E.
4. Water-reducing High-range, admixture: ASTM C 494, type F.

2.05 CURING MATERIALS

A. Absorptive cover: AASHTO M 182, class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sy. Dry.

B. Moisture-retaining cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: potable.

D. Evaporation retarder: waterborne, monomolecular film forming, manufactured for application to fresh concrete.

E. Clear solvent-borne liquid-membrane-forming curing compound: ASTM C 309, type 1, class b.

F. Clear waterborne membrane-forming curing compound: ASTM C 309, type 1, class b.

G. White waterborne membrane-forming curing compound: ASTM C 309, type 2, class b.

H. Products: subject to compliance with requirements, provide one of the following (or approved equal):

1. Evaporation Retarder (or approved equal):

a. Finishing Aid Concentrate; Burke Group, LLC.
b. Sure Film; Dayton Superior Corporation.
c. Eucobar; Euclid Chemical Co.
d. Confilm; Master Builders, Inc.

2. Clear Solvent-Borne Liquid-Membrane-Forming Curing Compound (or approved equal):

   a. Res-X Cure All Resin; Burke Group, LLC.
   b. Day-Chem Rez Cure; Dayton Superior Corporation.
   c. Kurez DR; Euclid Chemical Co.
   d. 3100-Clear; W. R. Meadows, Inc.

3. Clear Waterborne Membrane-Forming Curing Compound (or approved equal):

   a. Aqua Resin Cure; Burke Group, LLC.
   b. Day Chem Rez Cure (J-11-W); Dayton Superior Corporation.
   c. 1100 Clear; W. R. Meadows, Inc.

4. White Waterborne Membrane-Forming Curing Compound (or approved equal):

   a. Aqua Resin Cure; Burke Group, LLC.
   b. 1200-White; W. R. Meadows, Inc.

2.06 RELATED MATERIALS

A. Expansion-and isolation-joint-filler strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Closed cell foam specifically manufactured for expansion joints.

C. Wheel stops: precast, air-entrained concrete; 4,000-psi minimum compressive strength. Provide chamfered corners and drainage slots on underside, and provide holes for dowel-anchoring to substrate.

   1. Dowels: galvanized steel, epoxy coated, diameter of 3/4 inch, minimum length.

D. Slip-resistive aggregate finish: factory-graded, packaged, rustproof, non-glazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

E. Bonding agent: ASTM C 1059, type ii, non-redispersible, acrylic emulsion or styrene butadiene.

F. Epoxy bonding adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

   1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
   2. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.07 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the trial batch method.

1. Do not use Owner's field quality-control testing agency as the independent testing agency.

C. Proportion mixes to provide concrete with the following properties:

1. Compressive strength (28 days): 4000 psi, unless noted otherwise.
2. Flexural strength (28 days); 650 psi.
3. Maximum water-cementitious materials ratio: 0.45.
4. Slump limit: 4 inches.

a. Slump limit for concrete containing high-range water-reducing admixture: not more than 8 inches after adding admixture to plant, or site-verified, 3-inch slump.

D. Cementitious materials: limit percentage, by weight, of cementitious materials other than Portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.

E. Cementitious materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:

1. Fly Ash: 0%
2. Ground Granulated Blast-Furnace Slag (GGBFS): 0%
3. Micro-Silica: 0%
4. When using multiple pozzolans materials, do not exceed the individual maximum contents above for each material. A combination of pozzolans materials may not exceed 50% of the total cementitious content by weight.

F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows, within a tolerance of plus or minus 1.5 percent:

1. Air content: 5.5 percent for 3/4-inch maximum aggregate.

G. Coloring agent: add coloring agent to mix according to manufacturer's written instructions.

2.08 CONCRETE MIXING

A. Ready-mixed concrete: comply with manufacturers’ requirements and with ASTM C 94.

B. Ready-mixed concrete: comply with manufacturers’ requirements and with ASTM C 94 and ASTM C 1116.

1. When air temperature is between 85 deg f and 90 deg f, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg f, reduce mixing and delivery time to 60 minutes.

C. Project-site mixing: comply with requirements and measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixers of 1 C.Y. or smaller capacity, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
2. For mixers of capacity larger than 1 C.Y., increase mixing time by 15 seconds for each additional 1 C.Y.
3. Provide batch ticket for each batch discharged and used in the work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added.

PART 3 - EXECUTION

3.01 PREPARATION

A. Proof-roll prepared sub-base surface with tandem 20 C.Y. dump truck with rock, to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and sub-grade is ready to receive pavement.

B. Owners' representative(s) must be present at time of proof-rolling for proof-roll to be acceptable to Owner/Engineer.

C. Remove loose material from compacted sub-base surface immediately before placing any concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage or discoloration.

3.03 STEEL REINFORCEMENT

A. General: comply with CRSIs "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSIs "Placing Reinforcing Bars" for placing and supporting reinforcement.

1. Apply epoxy repair coating to uncoated or damaged surfaces of epoxy-coated reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement at all times.

D. Install welded wire fabric. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap to adjacent mats.

3.04 JOINTS

A. General: construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction joints: set construction joints at side and end terminations of pavement, and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
3. Provide tie bars at sides of pavement strips where indicated.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation / Expansion joints: form joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate isolation and expansion joints adjacent to structures and fixed anchorage points.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction joints: form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the following radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

a. Radius: 1/4 inch.

2. Sawed joints: form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

E. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt- coat one-half of dowel length to prevent concrete bonding to one side of joint.

F. Edging: tool edges of slabs, gutters, and curbs in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

1. Radius: 1/4 inch.

G. Saws: Use diamond blade saws equipped with cutting guides, blade guards, water cooling systems, dust control, and cut depth control. Early entry saws require approval of Engineer.

3.05 CONCRETE PLACEMENT

A. Inspection: before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten sub-base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment. Box out around MH frame and grates. Install expansion joints.

D. Comply with requirements and with recommendations in ACI 304R for Measuring, Mixing, Transporting, and Placing Concrete.

E. Do not add water to concrete during delivery, at project site, or during placement.

F. Deposit and spread concrete in a continuous operation between pre-determined transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place. Cold Joints are not acceptable.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R, “Guide for Consolidation of Concrete”.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. In lieu of properly supporting wwf on chairs (300# man) CONTRACTOR may place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer, or use bonding agent if approved by Engineer.

I. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

J. Curbs and gutters:

1. When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements to the Engineer. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
2. Curbs: all curbs shall match called out curbing on Contract Documents. Cast-in-place concrete shall be used unless other design is required to match existing conditions. Concrete shall be Class C. Slump shall be a maximum of 4 inches and minimum 28-day strength shall be 4000 psi with 6 to 8 percent entrained air. Max w/c ratio 0.45

   a. Expansion joints shall be specified and shall be shown on the drawings. Color of the joint sealer shall match that of the concrete.
   b. Four inch under drains in porous backfill shall be installed under all combination curbs and gutters. Under drains shall extend to the nearest feasible drainage basins. Combination curb and gutter may be used only to match or repair existing work.

K. Walks: For commercial projects thickness shall be 8 inches over 4 inches of compacted no. 304 limestone gravel base unless directed otherwise by the Engineer. The concrete shall have tooled edges which are then disguised by a light/medium broom finish. Except where required for structural purposes, reinforcing bars or welded wire fabric should be omitted unless otherwise specified by the Contract Documents. For conventional concrete walks, use Class C concrete with clean natural sand, limestone aggregate, and 6 to 7 percent entrained air.

1. Curing compounds: specify only non-staining type. It has been found that clear chlorinated rubber compounds cause staining which cannot be removed.

L. Curb ramps for persons with disabilities: see the ADAAG 4.7.

1. Companion ramps: state laws require that when a curb ramp is built on one side of a street, a companion ramp is required on the opposite side of the street. When project limits would normally end within a street intersection, the limits must be extended to allow construction of a companion ramp on the far side of the intersection. For projects in which federal funding is involved, this requirement must carefully be coordinated with federal requirements regarding limits of federal participation.

M. Slip-form pavers: when automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements to the Engineer. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact sub-base and prepare sub-grade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 75 percent of its 28-day compressive strength.

O. Cold-weather placement: comply with ACI 306R-16 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

P. Hot-weather placement: place concrete according to recommendations in ACI 305R-10 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
2. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature remove before embedding in concrete.
3. Fog-spray forms, reinforcement steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without standing water, soft spots, or dry areas.

Q. Concrete paving:

1. Metal nosings on exterior stairs are prohibited.
2. Stairs, rails and cheek walls, slopes to drain. Any stairs should be kept to a minimum. Ramps are to be used whenever possible within ADAAG Guidelines.
3. All sidewalks, stairs and ramps must withstand vehicular loading.
4. Where not noted on drawings, curbs to match adjacent 6 inch x 18 inch curb or verify with Engineer.
5. Use concrete for walkways, drives, service courts, parking areas, dumpster pads, compactor pads, loading dock ramps, aprons, and bus pull offs. All items shall be designed for particular items and be verified by the Engineer.
6. Radiused intersections shall be poured monolithic and should extend to the outer limits of the curves. Segmented curves are prohibited.
7. Cross slope of all walks shall be 1/4 inch per foot (max.) and 1/8 inch per foot.
8. Walks abutting buildings shall bear on the foundation or be dowelled.
9. The full width of sidewalks adjacent to curbs shall be 1/4 inch above the curb.
10. Temperature steel in stair nosings must have a minimum of 1-1/2" of concrete cover.
11. [CONTRACTORS] are required to wet sub-base prior to placing the concrete.
12. Curbs shall be poured concrete with #5 top and bottom reinforcing and without gutters. Provide contraction joints at 15 ft. max intervals. Filler strips must be specified.

    a. Dropped curbs for drive and handicapped access shall be formed for all new work.
    b. Remove existing curb back to nearest existing joint when new curbs extend into existing curb lines.

c. Paving base should extend a minimum of 6 inches beyond the edge of the surface if curbs are not provided.

13. Combined fire service/sidewalks shall be designed to accommodate Fire Department's largest vehicles' (minimum 12 ft. wide) turning radius and provisions for outrigger support.

3.06 CONCRETE FINISHING

A. General: wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float finish: begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power- driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Re-float surface immediately to uniform granular texture.

C. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float- finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

D. Finishes:

1. Vehicle Paving: Heavy broom.
2. Sidewalk: Light broom.
3. Gutters and Curbs: Light broom.
4. Pedestrian Ramps: Medium broom perpendicular to slope.

3.07 CONCRETE PROTECTION AND CURING

A. General: protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1-90 for cold-weather protection and follow recommendations in ACI 305.1-6 for hot-weather protection during curing.

B. Evaporation retarder: apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb. /S.F. before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Begin curing after finishing concrete, but not before free water has disappeared from concrete surface.

D. Curing methods: cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

a. Water.
b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's requirements. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.08 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.09 WHEEL STOPS

A. If shown on plans, securely attach wheel stops into pavement with not less than two galvanized steel, epoxy coated dowels embedded in holes cast into wheel stops. Firmly bond each dowel to wheel stop and to pavement. Extend upper portion of dowel 5 inches into wheel stop and lower portion a minimum of 18 inches into pavement.

3.10 FIELD QUALITY CONTROL

A. Testing agency: Inspect and test concrete materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this section.

B. Testing Services: Testing shall be performed according to the following requirements:

1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete and every 50 yds. Additional test will be required when concrete consistency changes.

3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive- strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 C.Y., but less than 25 C.Y., plus one set for each additional 50 C.Y. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
7. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches, or from each batch if fewer than five are used.
8. When total quantity of a given class of concrete is less than 50 C.Y., Engineer may waive compressive-strength testing if adequate evidence of satisfactory strength is provided.

    a. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
    b. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Owner/Engineer, concrete manufacturer, and contractor within 24 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

D. Nondestructive testing: impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer and Owner but will not be used as the sole basis for approval or rejection.

E. Additional tests: testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Engineer. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this section with characteristics exceeding those specified in this specification.

B. Drill test cores where directed by Owner/Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for substantial completion inspections.

E. Refer to Storm Water Pollution Prevention Plan (SWPPP) for additional information re washout area(s).

END OF SECTION 32 13 13

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SECTION 32 31 13 - CHAIN LINK FENCE & GATES

A. DESCRIPTION OF WORK

1. Extent of chain link fence and gate work is indicated on Drawings.
2. Provide chain link fences and gates as complete units controlled by a single source, including necessary erection accessories, fittings, and fastenings.

B. PRODUCT DATA

1. Submit manufacturer's technical product data, and installation instructions for metal fencing, fabric, and accessories.
2. Dimensions indicated for pipe and C-Sections are outside dimensions, exclusive of coatings.

C. MANUFACTURER

1. Subject to compliance with requirements, provide products from single source manufacturer.

D. MATERIAL

1. Fabric: Chain link fabric shall be woven from No. 9 gauge finished size steel wires, 2" mesh. Fabric finish shall be galvanized, ASTM A392, Class II, with not less than 2.0 oz. zinc per square foot of surface. Fabric shall be knuckled at one selvage and twisted and barbed at the other selvage. Furnish one-piece fabric widths for indicated fence height. See Drawings for extent of work.
2. Terminal Posts: All end, corner, and pull posts shall be roll formed section 3.5" x 3.5" with minimum bending strength of 486 pounds on 6' cantilever load coated with 2.0 ounces of hot dipped zinc in accordance with ASTM-A123 or 2.875" O.D. galvanized standard weight pipe with minimum bending strength of 381 pounds on 6' cantilever load coated with 1.8 ounces of hot dipped zinc in accordance with ASTM-F1083.
3. Line Posts: Line posts shall be C-Section roll-formed from steel conforming to ASTM-A570 grade 45, 1.875" x 1.625" with minimum bending strength of 247 pounds under a 6' cantilever load continuous coated with 2 ounces of zinc-aluminum alloy in accordance with ASTM-F1234, Type C or 4 ounces zinc coated per ASTM-F1234 Type A, or 2.375" O.D. standard weight Schedule 40 galvanized pipe with minimum bending strength of 201 pounds under a 6' cantilever load coated with 1.8 ounces of hot dipped zinc in accordance with ASTM-F1083.
4. Gate Posts: Gate posts shall be of the following sizes for single swing or one leaf of double gates:
   a. Leaf width up to 6'-0": 3.5" x 3.5" roll formed section (4.85 lbs/L.F.) or 2.875" O.D. pipe.
   b. Leaf width over 6'-0" to 13'-0": 4" O.D. pipe (9.11 lbs/L.F.)
5. Top and Brace Rail: Top and brace rails shall be roll-formed section of 1.625" x 1.25" channel shaped rail with minimum vertical bending strength of 237 pounds on 10' span continuous coated with 2 ounces of zinc-aluminum alloy per ASTM-F1234 Type C or 4 ounces of zinc coated per ASTM-F1234 Type A, or 1.66" O.D., standard weight Schedule 40 galvanized pipe with minimum vertical bending strength of 202 pounds on 10' span coated with 1.8 ounces of hot dipped zinc in accordance with ASTM-F1083. Top rail couplings 6" minimum in length shall be spaced at maximum 21' centers. Fabric tie wire shall be spaced at 24" maximum centers.
6. Fittings and Accessories: Provide all fittings and accessories as required for complete chain link fence installation, galvanized per ASTM-A 153, with zinc weights per Table I.
7. Post tops: Provide weather tight closure cap with loop to receive top rail; one cap for each post.
8. Tension Wire: Locate at bottom of fabric, 7 gauge class 3 galvanized wire.
9. Stretcher Bars: One piece lengths equal to full height of fabric, with minimum cross section of 3/16" x 5/8" for 6' high fencing. Provide one stretcher bar for each end post, and 2 for each corner and pull post. Stretcher bar bands shall be spaced not more than 15" O.C., to secure stretcher bars to posts.
10. Wire Ties: For tying fabric to line posts, use wire ties spaced 24" O.C. for tying fabric to tension wire, use hog rings spaced 24" O.C.
11. Gate Frames: Tubular shaped 1.90" O.D. with welded corners. Braces shall be furnished when necessary.

12. Barbed Wire: 12-1/2 gauge Class 3, zinc coated steel wire double-strand, twisted line wire with galvanized steel, 4 point barbs spaced approximately 5" on center, per ASTM A 121.
13. Barbed Wire Supporting Arms: Pressed steel arms with provisions for attaching 3 rows or barbed wire. Arms shall withstand 250 lb. (113.5kg) downward pull at the outermost end of arm without failure.
    a. Provide 45-degree, three-strands, single arm.
    b. Provide intermediate arms with hole for passage of top rail.
14. Privacy Slats: Provide and install manufacturer's standard vinyl privacy slats where indicated. Color shall be selected by Architect from manufacturer's standard range of colors.

E. INSTALLATION

1. Installer must examine the areas and conditions under which work of this section will be installed, and notify the Contractor of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.
2 Install all chain link fencing in strict accordance with ASTM F 567, the manufacturer's printed recommendations, and approved shop drawings, anchoring all components firmly to achieve, maximum longevity.
3. Do not span changes in elevation with chain link mesh. Provide terminal posts at differing heights. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30° or more.
4. Check each post for vertical and top alignment, and maintain in position during placement and finishing operations.
5. Bracing: Install horizontal pipe brace at mid-height for fences 6' and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.
6. Tension wire: Provide tension wire at bottom of fabric. Install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12-1/2 gauge hog rings 24" on center.
7. Top rail: Install lengths of 21'. Connect joints with sleeves for rigid connections for expansion/contraction.
8. Fabric: Install fabric on security side and attach so that fabric remains in tension after pulling force is released. Leave approximately 2" between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15" on center and to rails, braces, and tension wire at 24" on center.
9. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15" on center.

END OF SECTION 32 31 13

SECTION 329200 – TURFS AND LAWNS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide seeded lawns as shown on the construction documents and specified.

1. Soil preparation
2. Seeding lawns
3. Mulching
4. Maintenance

1.2 SUBMITTALS

A. Submit seed vendor's certification for required grass seed mixture, indicating percentage by weight, and percentages of purity, germination, and weed seed for each grass species.

B. Submit the following materials certification:

1. Fertilizer(s) analysis
2. Tackifier
3. Asphaltic emulsion
4. Seed

C. Submit materials test report

1.3 QUALITY ASSURANCE

A. Pre-installation conference: Conduct conference at project site

B. Provide and pay for materials testing. Testing agency shall be acceptable to the Engineer. Provide the following data:

1. Test representative material samples proposed for use.
2. Topsoil
   a. pH factor
   b. Mechanical analysis

c. Percentage of organic content

d. Recommendations on type and quantity of additives required to establish satisfactory pH factor and supply of nutrients to bring nutrients to satisfactory level for planting.

1.4 PROJECT CONDITIONS

A. Work Notification: Notify Owner at least 14 days prior to start of seeding operations.

B. Protect existing utilities, paving, and other facilities from damage caused by seeding operations.

C. Perform seeding work only after planting and other work affecting ground surface has been completed.

D. Restrict traffic from lawn areas until grass is established. Erect signs and barriers as required.

E. Provide hose and lawn watering equipment as required.

F. When watering spigots are not available, the Contractor shall supply water from a water tank truck which he shall furnish. Permits shall be taken out in each municipality for use of the fire hydrants as required.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver seed and fertilizer materials in original unopened containers, showing weight, analysis, and name of manufacturer. Store in a manner to prevent wetting and deterioration.

1.6 WARRANTY

A. The contractor is responsible to provide a full uniform lawn as approved by the owner. The contractor shall provide a warranty of one full growing season after the first full year of grass establishment. The contractor shall reseed areas with specified materials which fail to provide a uniform stand of grass until all affected areas are accepted by the Owner and Engineer of Record.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lawn Seed: Fresh, clean, and new crop seed mixture.

1. Mixed by an approved method.

2. Seed with the following mixture:

Temporary Seeding:

Seeding Dates

	Species	lb/1,000sf	lb/ Per Acre
March 1 to August 15	Oats	3	128(4 bushel)
	Tall Fescue	1	40 lbs
	Annual Ryegrass	1	40lbs
	Perennial Ryegrass	1	40 lbs
	Tall Fescue	1	40 lbs
	Annual Ryegrass	1	40 lbs
	Annual Ryegrass	1.25	55 lbs
	Perennial Ryegrass	3.25	142 lbs
	Creeping Red Fescue	0.4	17 lbs
	Kentucky Bluegrass	0.4	17 lbs
August 16 to November 1			
	Rye	3	112 (2 bushel)
	Tall Fescue	1	40 lbs
	Annual Ryegrass	1	40 lbs
	Wheat	3	120 (2 bushel)
	Tall Fescue	1	40 lbs
	Annual Ryegrass	1	40 lbs
	Perennial Ryegrass	1	40 lbs
	Tall fescue	1	40 lbs
	Annual Ryegrass	1	40 lbs
	Annual Ryegrass	1.25	40 lbs
	Perennial Ryegrass	3.25	40 lbs
	Creeping Red Fescue	0.4	40 lbs
	Kentucky Bluegrass	0.4	0 lbs
November 1 to February 29	Use Mulch or Dormant Seeding Only		

Permanent Seeding:

Normal seeding times are as follows:

March 15 to June 10
August 15 to October 1

Common Name	Percentage by Weight	Percentage by Purity	Percentage Germination	Percentage Weed Seed

	(Minimum)	(Minimum)	(Maximum)	
Kentucky Bluegrass	80%-90%	90%	85%	0.5%
Perennial Ryegrass	10%-20%	90%	88%	0.5%

B. Fertilizer

1. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

   a. Type A composition: Starter fertilizer containing 18% nitrogen, 24% phosphoric acid, and 6% potash by weight (18-24-6), or similar approved composition.

   b. Type B composition: Top dressing fertilizer containing 31% nitrogen, 3% phosphoric acid, and 10% potash by weight (31-3-10), or similar approved composition.

C. Mulches

1. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

2. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plantgrowth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

3. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

4. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

D. Tackifier: Liquid concentrate diluted with water forming a transparent 3-dimensional film-like crust permeable to water and air and containing no agents toxic to seed germination.

E. Asphaltic Emulsion Binder: Refined petroleum asphalt emulsified in alkaline water without use of clay, starch, or emulsified in alkaline water without use of clay, starch, or like deleterious substances, and not more than 0.75% of saponifiable acids, of a fluid consistency with no petroleum solvents or other diluting agents toxic to seed germination.

F. Water: Potable. Hoses or other methods of transportation furnished by Contractor. Contractor to pay for and supply all water.

G. Ground Limestone: Containing not less than 85% of total carbonates and ground to such fineness that 50% will pass through a 100-mesh sieve and 90% will pass through a 20-mesh sieve.

H. Inoculating Bacteria

a. The inoculant for treating leguminous seeds shall be a pure culture of nitrogen-fixing bacterial selected for maximum vitality, not more than one-year old. All cultures shall be subjected to the approval of the Engineer.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine finish surfaces, grades, topsoil quality, and depth. Do not start seeding work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Limit preparation to areas which will be immediately seeded.

B. Loosen topsoil of lawn areas to minimum depth of 4". Remove stones over 1" in any dimension and sticks, roots, rubbish, and extraneous matter.

C. Grade lawn areas to a smooth, free-draining even surface with a loose, moderately coarse texture. Roll and rake. remove ridges, and fill depressions as required to drain.

D. Apply Type A fertilizer to indicated turf areas at a rate equal to 1.0 lb. of actual nitrogen per 1,000 sq. ft. (220 lbs./acre).

E. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to seeding.

3.3 INSTALLATION

A. Lawn Seeding

2. Seed immediately after preparation of bed. Seed only between April 1 and June 1 and between August 15 and October 15, or at such other times acceptable to the Engineer.

3. Seed indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.

4. Sow grass seed at a rate of 8.0 lbs. per 1,000 sq. ft.

5. After seeding, rake or drag surface of soil lightly to incorporate seed into top 1/8" of soil. Roll with light lawn roller.

a. Type A Fertilizer: 1 lb. per 1,000 square feet or 220 lbs./acre.

b. Tackifier: 60 gals./acre.

c. Limestone: Rate determined by soil test.

B. Mulching

1. Place straw mulch on seeded areas within 24 hours after seeding.

2. Place straw mulch uniformly in a continuous blanket at the rate of 2 1/2 tons per acre, or 50-90 lb. per 1,000 sq. ft. of area (2-3 bales). A mechanical blower may be used for straw mulch application when acceptable to the Owner.

C. Provide straw bale checking in ditches or problem swales at intervals required to adequately slow water velocity and impede soil loss.

3.4 HYDROSEEDING

A. Hydroseeding: Mix specified seed and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with tackifier.

2. Spray-apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate shown in the previous paragraphs above.

3. Spray-apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than the rates, dry weight, and seed component is deposited at not less than the specified seed-sowing rate shown in the previous paragraphs above. Apply slurry cover coat of fiber mulch (hydromulching) at not less than the 2,000 lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate shown in the previous paragraphs above.

3.5 MAINTENANCE

A. The Contractor shall be responsible for continued proper care of the lawn areas one full growing season after final acceptance of the site. The period of maintenance for seeding and sodding shall extend for as long as necessary to establish over the entire lawn areas a uniformly close stand of grasses, free of weeds and undesirable grasses or 12 months after final completion, whichever comes first. A uniformly close stand of grass is defined as bare spots no larger than 6" diameter that constitute less than 2% of the entire lawn. Upon written acceptance of lawn area by the Engineer, the Owner will assume maintenance responsibility.

B. Maintain seeded lawn areas, including watering, spot weeding, mowing, applications of herbicides, fungicides, insecticides, and re-seeding until a full, uniform stand of grass free of weeds, undesirable grass species, disease, and insects is achieved and accepted by the Owner in behalf of the Engineer.

1. Water daily to maintain adequate surface soil moisture for proper seed germination. Continue daily watering for not less than 30 days. Thereafter, apply 1/2" of water twice weekly until acceptance.

2. Repair, rework, and re-seed all areas that have washed out, are eroded, or do not catch.

3. Mow lawn areas as soon as lawn top growth reaches a 3-3/4" height. Cut back to 2 1/2" in height. Repeat mowing as required to maintain specified height. A minimum of three months of mowings will be required for acceptance.

C. Maintain seeded banks, ditches, medians, and fields to the extent of establishment only. Re-grade and re-seed washed out or eroded areas as required until a suitable cover is established.

3.6 ACCEPTANCE

A. Seeded areas will be inspected at completion of installation and accepted subject to compliance with specified materials and installation requirements.

1. Seeded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, uniform, close stand of the specified grass is established free of weeds, undesirable grass species, disease, and insects.

2. No individual lawn areas shall have bare spots or unacceptable cover totaling more than 2% of the individual areas, in areas requested to be inspected. Bare spots does not exceed an area of 5-inch x 5-inch.

B. Upon final acceptance, the Owner will assume lawn maintenance.

3.7 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment. Repair damage resulting from seeding operations.

B. During work, keep premises neat and orderly including organization of storage areas. Remove trash, including debris resulting from removing weeds or rocks from planting areas, preparing beds, or planting plants, from site daily as work progresses. Keep walkway and driveway areas clean by sweeping or hosing.

END OF SECTION 32 92 00

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SECTION 333000 - SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. This Section specifies the requirements for furnishing and placing sanitary sewer pipe, laterals, stubs, and appurtenances. The pipe shall be of the size, type and location, and to the lines, grades and elevations shown on the Construction Documents and constructed in accordance with these specifications.

B. Record location of pipes runs, connections, catch basins, cleanouts, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

D. Conform to VILLAGE and Authorities having Jurisdiction (AHJ) requirements.

1.02 APPLICABLE PUBLICATIONS

A. The following publications of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto.

1. American Society for Testing and Materials Standards (ASTM).

   a. A 48 Specification for Gray Iron Castings
   b. A 615 Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   c. A 746 Standard Specification for Ductile Iron Gravity Sewer Pipe.
   d. C 33 Standard Specification for Concrete Aggregates.
   e. C 76 Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
   f. C 150 Standard Specification for Portland Cement.
   g. C 443 Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets.
   h. C 476 Specification for Grout for Masonry.
   i. C 478 Specification for Circular Precast Reinforced Concrete Manhole Sections.
   j. C 969 Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
   k. D 2241 PVC Pressure-Rated Pipe (SDR Series).
   l. D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

m. D 3034 Specification for Polyvinyl Chloride (PVC) Pipe and Fittings (4" to 15"). PVC pipe shall be made from class 12454-B materials or better in accordance with ANSI/ASTM D 1784. PVC fittings and couplings shall conform to requirements of the PVC pipe for classifications and size.
n. D 3212 Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
o. F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe. Lubricants for joints shall be furnished by the pipe manufacturer. The rubber gaskets shall be factory installed in the bell of the pipe, fittings and couplings. The plain end of the pipe shall be clearly marked by the manufacturer to show depth of penetration into the bell or coupling.
p. F 679 Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings (18"-27").
q. F 1417 Standard Test Method for Installation Acceptance of Plastic Non-Pressure Sewer Lines Using Low-Pressure Air.

2. American Water Works Association (AWWA)

a. C 105 Polyethylene Encasement for Ductile-Iron Pipe Systems.
b. C 110 Standard for Ductile-Iron and Gray-Iron Fittings.
c. C 111Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
d. C 600 Installation of Ductile Iron Water Mains and Their Appurtenances.

3. American Concrete Institute (ACI)

a. ACI 318 Building Code Requirements.

1.03 SUBMITTALS

A. Product Data:

1. Pipe material and fittings
2. (N/A) Corrosion proof liner selected for protecting concrete pipe from sewer gases. Contractor shall submit data on the selected liner for approval prior to construction .
3. Any Special pipe fittings as detailed in the Contract Documents.

B. Shop Drawings:

1. Cast in Place Manholes: Include plans, elevations, sections, details, design calculations, concrete design-mix report, frames, and covers.
2. Field Quality Control Test Reports

1.04 DEFINITIONS

A. ABS: Acrylonitrile-Butadiene-Styrene Plastic.

B. FRP: Fiberglass-Reinforced Plastic.

C. LLDPE: Linear Low-Density, Polyethylene Plastic.

D. PE: Polyethylene Plastic.

E. PP: Polypropylene Plastic.

F. PVC: Polyvinyl chloride Plastic.

G. TPE: Thermoplastic Elastomer.

H. DI: Ductile-Iron Pipe.

1.05 PROJECT CONDITIONS

A. When working with sanitary manholes new or existing, Contractor must keep requirements for confined space entries. In all activities, Contractor shall work in a safe manner as required by OSHA and other governing criteria.

1. If work requires interference with any public sewer systems within or outside of Public Rights of Way or Easements, Contractor must obtain prior approval and coordinate with local municipality before commencing work.

1.06 DELIVERY STORAGE AND HANDLING

A. Contractor is responsible for protecting materials per manufacture's recommendations

1. Do not store plastic, pipe and fittings in direct sunlight.
2. Protect pipe, pipe fittings and seals from dirt and damage. Handle and store pipe, and fittings in accordance with manufacturer's recommendations.
3. Handle cast in place manholes according to manufacturer's written rigging instruction.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS (Refer to Contract Drawings)

A. Polyvinyl Chloride (PVC) Pipe and Fittings

1. 4 to 15 inch pipe shall conform to ASTM D 3034,
2. Pipe and fittings shall conform to ASTM F 679 for 18-imch to 48-inch pipe.
3. All mainline sewer shall be SDR 26 while service connections under 13 feet deep shall be SDR 35. If service connection is greater than 13 feet pipe shall be SDR 26.
4. All diameters shall use bell and spigot ends for gasketed joints with ASTM F 477 elastomeric seal. The joint design shall meet the requirements of ASTM D 3212.
5. All pipe and fittings shall be suitably marked to provide manufacture's name or trademark, lot or production number, ASTM designation, PVC cell classification, SDR number and nominal diameter.

6. Pipe color shall be green to identify it as a sewer.
7. All pipe shall be made from a PVC resin, compound to provide physical and mechanical properties that equal or exceed cell class 12454 or 1264 as defined in ASTM D 1784.
8. Pipe lubrication products are to be provided by pipe manufacturer or from supplier approved by manufacturer.

B. High Density Polyethylene (HDPE) Pipe and Fittings

1. Pipe shall be dual wall, smooth interior and annular exterior corrugations HP Santite or Equal.
2. to 30-inch pipe shall meet ASTM F2764 with minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412
3. Pipe shall be joined using a bell and spigot joint meeting the requirements of ASTM F2764. The joint shall be watertight per the requirements of ASTM D3212, with the addition for a 15 psi pressure requirement. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable protective wrap to ensure the gaskets are free from debris.
4. A joint lubricant shall be used on the gasket and bell during assembly.
5. For pipes 12 through 60" diameters shall have reinforced bell with a polymer composite band installed by the manufacturer.
6. Fittings shall conform to ASTM 2764. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the water tight joint performance requirements of ASTM D3212.
7. Pipe shall be tested for water tightness per ASTM F1417 or ASTM F2487.

2.02 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water

   a. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter or other substances injurious to the finished product.
   b. Water sources other than the local municipal domestic water supply must be approved by the Owner/Engineer.
   c. If on-site reclaimed water sources are used, tanks and other appurtenances must be clearly marked with the words "non-potable" water.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Use air-entrained concrete for any exposed concrete.

C. Reinforcement Bars: ASTM A 615, Grade 60 deformed steel.

D. Manhole Channels and Benches: Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Channels: Factory or field formed from concrete. Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 1 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 8 percent.

E. Ballast and Pipe Supports: Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

2.03 MANHOLES

A. Precast concrete manholes shall conform to ASTM C 478.

B. Ballast: Increase thickness of concrete as required to prevent flotation.

C. Resilient Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection. Link Seals or Kor-n-Seal type boots for weathertightness, mortar joints are prohibited.

D. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.

E. Grade Rings: Include two or three reinforced-concrete rings, of maximum 12-inch total thickness, that match 24-inch diameter frame and cover. Rings shall be set in a full bed of mortar.

F. Steps: Shall be Neenah R-1980-1 cast iron, complying with ASTM A 615/A 615M, ASTM C 478, or ½” reinforcing bar encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into base, riser, top section, and sidewalls with steps at 16 inch intervals on center. No pipes shall enter a manhole in the thru the step area.

G. Manhole frames and covers: Neenah R-1540 with self-sealing cover. Include indented top design with lettering "Sanitary Sewer" cast into cover. All fames and grates within R/W shall comply with AHJ’s requirements.

H. Manholes shall be installed: at the end of each line; at all changes in grade, size, or alignment; at all intersections; and at distances not greater than 400 feet for sewers 15 inches or less, and 500 feet for sewers 18 inches to 30 inches, except that distances up to 600 feet may be approved in cases where modern cleaning equipment for such spacing is provided.

I. A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the differences in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert should be filleted to prevent solids deposition.

1. Drop manholes should be constructed with an outside drop connection. Inside drop connections when necessary shall be secured to the interior wall of the manhole and provide access for cleaning.
2. Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete (12" min.).

J. The minimum diameter of manholes shall be 48 inches; larger diameters are preferable for large diameter sewers. A minimum access diameter of 24 inches shall be provided.

K. The flow channels through manholes should be made to conform in shape and slope to that of the sewers.

L. Structure channels and benches: factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
2. Benches: Concrete, sloped to drain into channel, Slope: 8 percent (max.).

M. Pre-cast manholes shall be coated in the plant, the interior barrel, joint and slab top surface areas of the precast manhole shall be prepared per the manufacture's recommendations. Concrete must be etched with 15% to 20% muriatic acid solution or sandblasted, the surface so prepared shall then be lined with a high build polyamide-cured, 2-component coal tar epoxy coating "Bitumastic No. 300-m as manufactured by Koppers Company, Inc, Pittsburgh, Pennsylvania, 15219, or an approved equal, each meeting military specifications DOD-P-2326A (SH), Type 1, Class 2. The lining compound shall be sprayed two or more coats with a minimum of ten to twelve dry mils (twelve to fourteen wet mils) per coat to obtain a continuous and relatively smooth lining. The total dry film thickness should not be less than 20 mils (0.02 inches). Additional coatings may be necessary within industrial areas, as shown on the plans. All coated surface of manhole shall be free of surface irregularities such as air bubbles, blistering, pinholes porosity in the coating film.

N. Manholes shall be pre-cast concrete or poured in place concrete type. Manholes shall be water proof on the exterior.

O. Inlet and outlet pipes shall be joined to the manhole with a gasketed flexible watertight connection or any connection arrangement that allows differential settlement of the pipe and manhole wall to take place. Non-shrink grout is not to be substituted without Engineer approval.

P. Watertight, bolted manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water.

2.04 MORTAR

A. Mortar for flow line directioning in all manholes shall conform to ASTM C 476.

2.05 CLEANOUTS

A. Gray-iron cleanouts: ASME A112.36.2m, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

1. Light Duty: In earth or grass foot-traffic area with metallic locating lid.
2. Medium Duty: In paved foot-traffic areas.
3. Heavy Duty: In vehicle-traffic parking lots, drives, service areas. Recess slightly below pavement surface.
4. Extra-Heavy Duty: In public roads. Recess slightly below pavement surface.
5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings in roads and parking areas.
6. Sewer Pipe Fitting and Riser to Cleanout: In other areas material matching sewer pipe may be utilized

B. PVC Cleanouts (when approved by Engineer): PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser.

C. Available Manufacturers

1. Canplas Inc.
2. IPS Corporation.
3. NOS Inc.
4. Zurn Commercial Specialty Plumbing Products; Zurn Plumbing Products Group.

D. Lid and Frame: Cast iron construction, hinged lid.

E. Conform to standard details of Authorities Having Jurisdiction (AHJ).

PART 3 - EXECUTION

3.01 PIPE SEWERS

A. No pipe shall be installed in the trench until excavation has been properly constructed per the Contract Documents to at least two (2) pipe lengths beyond the section of pipe being installed and the bottom of the trench has been properly shaped.

B. Batter boards, where used, shall be placed into position properly. Boards shall be nominal 1 x 4 inch lumber, planed on all four sides to parallel faces. The boards and all location stakes must be protected from injury or change of location.

C. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

D. Pipe shall be laid so that after the sewer is completed, the interior surface shall conform accurately to the grades and alignments fixed and given in the Contract Documents.

E. All sewers must be laid accurately to line and grade, with tongue or spigot end downstream.

F. Install gravity flow, non-pressure pipe for site storm sewer pipes according to the following:

1. Install piping pitched down in the direction of flow.
2. Install PVC sewer pipe according to ASTM D 2321, ASTM D 2774 and ASTM F 1688.

G. Pipes shall be fitted together and matched so that when laid, they form a sewer with a smooth and uniform invert.

H. Before laying pipes, a sufficient bed shall be prepared at the grade indicated on the Contract Documents. Backfill shall be placed in accordance with backfill requirements.

I. A minimum clearance of 6 inches must be maintained between the sewer and all other lines. Sanitary sewers shall not be routed over water lines without approval from the Engineer.

J. Sanitary sewers shall not be constructed within 10 ft. (outside to outside) parallel to a water line. Where sanitary sewers cross under water lines, the pipe material for the sewer shall be an 18 ft. length of ductile iron pipe or PVC schedule 80 pressure pipe, centered on the water line.

K. When trenches exceed OSHA requirements, the Contractor shall utilize appropriate trench safety measures.

L. Pipe deflection shall be checked by passing a deflection gage or mandrel through all completed pipelines. Maximum deflection allowed is 5%.

3.02 MANHOLES

A. Manholes shall be constructed at locations and depths indicated on the Contract Documents.

B. Manholes may be constructed of concrete or precast concrete sections and in all types shall be constructed to the dimensions shown on the Contract Documents. Where concrete or precast concrete sections are used, the interior wall shall be thoroughly coated with coal tar epoxy or approved equal.

C. Joints between precast concrete sections shall be made by uniformly placing gaskets equal on all faces of the lower part of the joint and lowering the upper ring evenly into place to produce uniform bearing and compression on the sealer.

D. The construction of manholes shall be done as soon as practical after sewer lines into or through the manhole are completed.

E. All sewers shall be cut neatly at the inside face of the walls of the manhole pointed up with mortar.

F. After the masonry work has been completed to the proper elevation, the cast iron manhole cover/frame shall be set in a full mortar bed and adjusted to the elevation established on the Contract Documents.

G. The inverts of the sewer line or several sewer lines entering the manhole at or near the flow line elevation of the manhole shall be shaped and routed across the floor of the manhole using mortar to obtain the proper contour.

H. When sanitary sewer pipes enter a manhole 2 ft. or greater above the bottom of the manhole, a drop pipe of equal diameter shall be constructed outside the manhole to the bottom of the manhole per the details on the Contract Documents.

I. All manholes are to be backfilled properly.

3.03 FRAMES, GRATES, RINGS AND COVERS

A. HD castings shall conform to the types shown on the Contract Documents and shall be clean castings, free from sand or blow holes or other defects. Materials shall be not less than Class 30B gray iron conforming to ASTM A 48.

B. Surfaces of the castings shall be free from burnt-on sand and shall be reasonably smooth.

C. Bearing surfaces between manhole rings and covers/frames shall be cast or machined with such precision that uniform bearings shall be provided throughout the perimeter area of contact.

3.04 FIELD

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter or mandrel test per ASTM D 522.
c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified. Re-inspect and repeat procedure until results are satisfactory.
4. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
5. Do not enclose, cover, or put into service before inspection and approval have taken place.
6. Test completed piping systems according to requirements of authorities having jurisdiction (AHJ).
7. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' notice.
8. Submit separate report for each test.

B. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

1. Allowable leakage is maximum of 50 gal. /inch of nominal pipe size per mile of pipe, during 24-hour period.
2. Close openings in system and fill with water.
3. Purge air and refill with water.
4. Disconnect water supply
5. Test and inspect joints for leaks.
6. Option: Test Ductile-Iron piping according to AWWA C 600, "Hydrostatic Testing" Section. Use test pressure of at least 10 psig.

C. Leakage Test: Leakage tests shall be performed to verify that leakage outward or inward (exfiltration or infiltration) shall not exceed 200 gallons per inch of pipe diameter per mile per day for any section of the system. This may include appropriate water or low pressure air testing. An exfiltration or infiltration test shall be performed with a minimum positive head of 2 feet. The air test, if used, shall, as a minimum, conform to the test procedure described by ASTM C-828-76T.

D. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction (AHJ), and the following:

1. Option: Test plastic gravity sewer piping according to ASTM F 1417.
2. Leaks and loss in test pressure constitute defects that must be repaired.
3. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

E. Manhole tests: Test sanitary manholes according to requirements of authorities having jurisdiction (AHJ), and the following:

1. Option: Vacuum testing:

a. Install vacuum tester head assembly at top access point of manhole and adjust for proper seal on straight top section of manhole structure. Following manufacturer's instructions and safety precautions, inflate sealing element to recommended maximum inflation pressure; do not over-inflate.

b. Evacuate manhole with vacuum pump to 10 inches mercury, disconnect pump, and monitor vacuum for time period specified in, Vacuum Test Time Table. Test times for larger manholes are to be in conformance with authority having jurisdiction (AHJ).

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Minimum Test Times in seconds

	Diameter, in.								
	30	33	36	42	48	54	60	66	72
Depth (ft.)	Time, in seconds								
<4	6	7	7	9	10	12	13	15	16
6	9	10	11	13	15	18	20	22	25
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	29	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

c. A manhole passes the test if after 2 minutes and with all valves closed, the vacuum is at least 9 inches of mercury.

2. Option: Perform hydraulic test according to ASTM C 969
3. Leaks and loss in test pressure constitute defects that must be repaired.
4. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

END OF SECTION

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SECTION 33 40 00 - STORM WATER DRAINAGE PIPING

PART 1 - GENERAL

1.1 WORK INCLUDES

A. This section includes storm drainage system installation for facilities located outside of the building including the following:

1. Pipe and Fittings
2. Manholes
3. Catch Basins/Curb Inlets
4. Cleanouts

B. Contractor shall field measure all existing storm sewer tie in points and report discrepancies from the plans to the engineer of record.

C. Contractor shall record final constructed locations of pipe runs, connections, manholes, catch basins, cleanouts, and invert elevations.

D. Where applicable, discharge piping from an RPZ connected to a storm sewer shall be equipped with backwater check valve.

1.2 DEFINITIONS

A. RCP: Reinforced Concrete Pipe

B. PVC: Polyvinyl Chloride Plastic.

C. HDPE: High Density Polyethylene.

D. ASTM: American Society of Testing and Materials.

E. AASHTO: American Association of State Highway and Transportation Officials.

F. ODOT: Ohio Department of Transportation Construction and Material Specifications (latest edition)

1.3 SUBMITTALS

A. Submit shop drawings prior to ordering materials for approval.

B. Shop drawings: include plans, elevations, inverts, details, and attachments for the following:

1. Storm sewer pipe, fittings and joint material.

2. Pre-cast concrete manholes, catch basins, curb inlets and other structures, including frames, covers and grates; inverts, rims, concrete strength and reinforcement.
3. Cast-in-place concrete manholes, catch basins, curb inlets and other structures, including frames, covers and grates; inverts, rims, concrete strength and reinforcement.

C. Design mix reports and calculations: for each class of cast-in-place concrete.

D. Field test reports: indicate and interpret test results for compliance with performance requirements.

1.4 PERFORMANCE REQUIREMENTS

A. Gravity-flow, non-pressure-piping pressure ratings: at least equal to system test pressure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures, pipe, and fittings in direct sunlight. Store in accordance with manufactures requirements.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Care shall be taken not to injure the coating or lining of pipe or other materials during the handling of transportation of the materials.

D. Non-rigid pipe shall be stored to prevent bowing. Pipes with deviations from straight greater than 1/16 inch per foot shall not be used.

E. Handle and store pipe, precast concrete manholes and other structures according to manufacturer's written rigging, unloading & storage instructions.

1.6 QUALITY ASSURANCE

A. Comply with the requirements of authorities having jurisdiction and manufacturer’s requirements

1.7 PROJECT CONDITIONS

A. Site information: perform site survey, research public utility records, and verify existing utility locations as required by State Revised Code.

B. Locate and field measure existing structures and piping to be tied into or closed and abandoned. Report any discrepancies to the engineer for further direction.

C. Existing utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions, and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. No utility interruptions are allowed without the Owner’s written permission.

3. Contractor is to include known utility interruptions in project schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. All manufacturers are subject to compliance with requirements, specifications, and construction details, and must demonstrate compliance through appropriate test and documentation.

2.2 PIPING MATERIALS

A. If a specific type of pipe is specified on the drawings, the specified type must be used. All pipes, unless noted, are to use soil tight joints. All pipe and fittings used shall be suitably marked with the manufacture's name or trademark, lot or production number and ASTM designation and also include all requirements from ASTM A746.

B. If a type of pipe is not specified, one of the following shall be provided:

1. Reinforced Concrete Pipe and Fittings

   a. Reinforced Concrete Pipe and Fittings per ASTM C-76.
   b. Bell and spigot or tongue and groove ends and resilient and gasketed joints per ASTM C 443, rubber gaskets sealant joints with ASTM C-990, bitumen or butyl-rubber sealant.

2. High Density Polyethylene (HDPE) Pipe and Fittings

   a. Pipe shall be dual wall, smooth interior and annular exterior corrugations per ASTM F2648.
   b. to 10-inch pipe shall meet AASHTO M252, Type S or SP
   c. to 60-inch pipe shall meet AASHTO M294, Type S or SP, or ASTM F2306.
   d. Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the soil tight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.
   e. Soil tight joints shall be joined using a bell and spigot joint meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be soil-tight and gaskets for pipes 12 through 60-inch, shall meet the requirements of ASTM F477. For pipes 4-10-inch, the joint shall be soil tight using and engaging dimple connection.
   f. Perforated pipe shall consist of AASHTO Class II perforations.

3. Ductile Iron Pipe and Fittings:

   a. Pipe shall conform with AWWA C151/ANSI 21.11, Class 52 with push-on joints
   b. Gaskets per AWWA C111, rubber.

4. Polyvinyl Chloride (PVC) Pipe and Fittings

a. All pipe and fittings shall conform to ASTM 3034 for 4 to15-inch pipe with mainline sewer pipe being SDR 26 and service connections under 10 feet in depth (SDR 35) over 10 feet (SDR 26).
b. All pipe and fittings shall conform to ASTM F-679 for 18-inch and over SDR 26 pipe.
c. All joints shall be elastomeric gasket type and shall be assembled per manufactures recommendations and ASTM D 3212.

5. MANHOLES

C. Pre-Cast Concrete Manholes

1. Manholes shall conform to ASTM C 478, AASHTO M 199, with reinforced concrete (min. Fc' = 4,000 psi, air-entrained), of depth indicated, with joint seal between pre cast manhole sections shall be resilient and flexible gasket conforming to ASTM C-443.
2. Diameter: 48 inches inner diameter minimum, unless otherwise indicated on the Contract Drawings.
3. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
5. Structure channels and benches: factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio. Include channels and benches in manholes.

   a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
   b. Benches: Concrete, sloped to drain into channel, Slope: 8 percent (max.).

6. Riser Sections: 5-inch minimum thickness, and lengths to provide depth indicated.
7. Top Section: Eccentric-cone type, unless either concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
8. Gaskets: Resilient and flexible gasket conforming to ASTM C 443.
9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
10. Joint Sealant: ASTM C-442, bitumen or butyl rubber. In addition, to O-Ring joint between manhole sections, a flexible butyl rubber seal, Con Seal, or equal shall be used with a minimum temperature workability of 10 to 130 degrees Fahrenheit.
11. Flexible Sleeve: A watertight flexible sleeve Kor-n-Seal", Press Wedge or equal to be provided at all connections between manholes and pipes.
12. Grade Rings: Include two or three reinforced-concrete rings, of maximum 12-inch total thickness, that match 24-inch diameter frame and cover. Rings shall be set in a full bed of mortar.
13. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into base, riser, top section, and sidewalls with steps at 16 inch intervals on center. No pipes shall enter a manhole in the thru the step area.

14. Manhole frames and covers: ASTM A 536, grade 60-40-18, Ductile-Iron castings designed for heavy-duty service. Include 24-inch inside diameter by 7-to 9-inch riser with 4-inch minimum width flange, and 24-inch diameter cover. Include indented top design with lettering "Storm Sewer" cast into cover. All fames and grates within R/W shall comply with AHJ's requirements.
15. Lift holes shall be provided in each section for handling. Seal all lift holes with approved concrete plugs.

D. Cast-in Place Manholes

1. Cast-in-place concrete manholes: constructed of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16, heavy-traffic, and structural loading; of depth, shape, dimensions, and appurtenances indicated.
2. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
3. Concrete:

    a. Cement: ASTM C 150, Type II.
    b. Fine Aggregate: ASTM C 33, sand.
    c. Coarse Aggregate: ASTM C 33, crushed gravel.
    d. Water: Potable.

4. Portland cement design mix: 4000 psi minimum, with 0.45 maximum water-cementitious ratio.
5. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
6. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
7. Structure channels and benches:

    a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    b. Benches: Concrete, sloped to drain into channel, Slope: 8 percent (max.).

8. Grade Rings: Include two or three reinforced-concrete rings, of maximum 12-inch total thickness, that match 24-inch diameter frame and cover. Rings shall be set in a full bed of mortar.
9. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into base, riser, top section, and sidewalls with steps at 16 inch intervals on center. No pipes shall enter a manhole in the thru the step area.
10. Manhole frames and covers: ASTM A 536, grade 60-40-18, Ductile-Iron castings designed for heavy-duty service. Include 24-inch inside diameter by 7-to 9-inch riser with 4-inch minimum width flange, and 24-inch diameter cover. Include indented top design with lettering "Storm Sewer" cast into cover. All fames and grates within R/W shall comply with AHJ's requirements. Manhole frames hall be set in a full bed or mortar.

2.3 CATCH BASINS

A. Pre-Cast Concrete Catch Basin / Curb Inlets

1. Catch Basin/Curb Inlets shall conform to ASTM C 478, AASHTO M 199, with reinforced concrete (min. Fc' = 4,000 psi, air-entrained), of depth indicated, with joint seal between pre cast manhole sections shall be resilient and flexible gasket conforming to ASTM C-443.
2. Dimensions as indicated on the Contract Drawings.
3. Ballast: Increase thickness of precast concrete sections or add concrete extension to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 6-inch minimum thickness for walls for structures not under pavement and 8-inch for structures under pavement.
5. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
6. Gaskets: Resilient and flexible gasket conforming to ASTM C 443.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to catch basin.
8. Joint Sealant: ASTM C-442, bitumen or butyl rubber. In addition, to O-Ring joint between catch basin sections, a flexible butyl rubber seal, Con Seal, or equal shall be used with a minimum temperature workability of 10 to 130 degrees Fahrenheit.
9. Flexible Sleeve: A watertight flexible sleeve Kor-n-Seal", Press Wedge or equal to be provided at all connections between manholes and pipes.
10. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod (grade 60) complying with ASTM A 615/A 615M, ASTM C 478, and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 16 inch intervals on center. No pipes shall enter a catch basin in the thru the step area.
11. Catch Basin/Curb Inlet Frames and Grates: ASTM A 536, grade 60-40-18, ductile iron designed for heavy-duty service. Size: 24 by 24 inches minimum, unless otherwise indicated on construction detail. Frames shall be set in a full bed of mortar.

    a. Grate Free Area approximately 50 percent, unless otherwise indicated.
    b. Catch basin, area and yard drain covers in accessible ways shall be ADA compliant and bicycle wheel proof. Covers shall also be safe for shoes with narrow heels (1/4" gap maximum).

2.4 IMPACT MODIFIED COPOLYMER POLYPROPYLENE MANHOLES / CATCH BASINS

A. Impact modified copolymer polypropylene manhole/inlets meeting the material requirements of ASTM F2764. Eccentric cones shall be manufactured from polyethylene material meeting ASTM D3360 cell class 213320C.

B. The joint shall conform to ASTM D3212 using flexible elastomeric seals.

C. Elastomeric seals used for polyethylene cone and pipe connectors to the structure shall conform to ASTM F477.

D. Provide a watertight connection for pipes entering the manhole/catch basin and provide adapters as specified by the manufacturer.

E. Frame and Grate shall be 30-inch in diameter and conform to ASTM A536 grade 70-50-05 and painted black.

F. No brick or concrete block shall be used to set frame and grate to grade.

G. All grates shall be set in a 3’x3’x8" concrete pad

2.5 CLEANOUTS

A. Gray-iron cleanouts:

1. ASME A112.36.2m, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following applications:

   a. Light Duty: In earth or grass foot-traffic areas.
   b. Medium Duty: In paved foot-traffic areas.
   c. Heavy Duty: In vehicle-traffic parking lots, drives, service areas. Recess slightly below pavement surface.
   d. Extra-Heavy Duty: In public roads. Recess slightly below pavement surface.
   e. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts (when approved by Engineer):

1. PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.

   a. Light Duty: In earth or grass foot-traffic areas.
   b. Medium Duty: In paved foot-traffic areas.
   c. Heavy Duty: In vehicle-traffic parking lots, drives, service areas. Last section of pipe at surface shall be cast iron cut to field measurement ANSI Class 25. Set Cleanout casting in 3’-0" square, 8-inch thick 4,000 psi concrete. Casting shall be a cast iron disc or cap with magnetic element imbedded and mastic sealed.

C. Lid and Frame: Cast iron construction, hinged lid.

2.6 PIPE SUPPORTS

A. Ballast and pipe supports: Portland cement design mix, 3,000 psi minimum, with 0.58 maximum water-cementitious ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31.

3.2 INSTALLATION, GENERAL

A. General locations and arrangements: drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, and per the requirements.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.

C. Use manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections, unless direct tap into existing sewer is indicated on the Contract Drawings.

D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. Install gravity flow, non-pressure pipe for site storm sewer pipes according to the following:

1. Install piping pitched down in the direction of flow.
2. Install RCP sewer pipe in accordance with ASTM C 1479.
3. Install HDPE sewer pipe in accordance with ASTM D2321.
4. Install PVC sewer pipe according to ASTM D 232, ASTM D 2774 and ASTM F 1688.
5. Install ductile iron pipe per AWWA C6000.

F. Install gravity-flow piping service connection to buildings storm drains or downspouts, of sizes and in locations as indicated. Terminate piping as indicated Contract Drawings.

G. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.

H. Comply with manufacturer’s requirements for installation, handling, and storage.

I. Utilize magnetic marking tape for storm sewers - Install [24"] below finished grade.

3.3 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to installations indicated and pipe manufacturer’s specifications.

1. Before joining pipe with a coupling or bell end, all surfaces of the portions of the pipe to be joined and all surfaces of factory made joining material shall be clean and dry. Lubricants, primers, adhesives, solvents bolts, etc. shall have been manufactured specifically for their intended use and shall be used as recommended by the pipe and/or pipe joint manufacturer. The jointing materials shall be fitted and adjusted or applied in such a manner to obtain a close fitting joint and to obtain and the degree of water tightness required.
2. Where joining pipes of different materials is required or approved, this works shall be done utilizing special adapters and couplers manufactured specifically for this purpose. The adapters and couplers shall be installed and securely attached to both pipe barrels according to manufactures recommendations.
3. As soon as possible after a joint is made, sufficient backfill materials shall be placed along each side of the pipe to support the pipe in its final position.
4. Where a pipe stub or run of pipe is to be temporality terminated for future expansion, the end of the pipe shall be sealed using and approved removable stopper.
5. Install PE film, pipe encasement over hubless cast-iron soil pipe and fittings according to ASTM A 674 or AWWA C105.
6. Handle, store, install and backfill all pipe in strict accordance with manufacturer's recommendations.

B. Install with top surfaces of components, except piping, flush with finished surface.

C. PVC sewer pipe and fittings as follows:

1. Join pipe and gasketed fittings with gaskets according to ASTM F 477.

2. Install according to ASTM D 2321.

D. Concrete pipe and fittings: install according to ACPA'S "Concrete Pipe Installation Manual."

3.4 MANHOLE INSTALLATION

A. General: install manholes, complete with appurtenances and as required by the City of Streetsboro and ODOT.

B. Form continuous concrete channels and benches between inlets and outlet.

C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

D. Install precast concrete manhole sections with gaskets according to ASTM C 891.

3.5 CATCH-BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated as shown on the plans.

B. Set frames and grates to elevations indicated.

C. Engineered PVC Manholes shall be installed per ASTM D2321.

3.6 STORM DRAINAGE INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as required by City of Streetsboro and ODOT requirements.

B. Construct riprap of stone, as indicated. Install with geotextile fabric, per City of Streetsboro and ODOT.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Construct energy dissipaters at outlets, as indicated.

F. Engineered PVC catch basins shall be installed per ASTM D2321.

3.7 TAP CONNECTIONS

A. Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work.

B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.

C. Make branch connections from side into existing piping. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 4000 psi.

D. Make branch connections from side into existing piping, or to underground structures by cutting opening into existing unit large enough to allow 3 inches of non-shrink grout to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

1. Use concrete that will attain minimum 28-day compressive strength of 4,000 psi, unless otherwise indicated.
2. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

A. Abandoned piping: close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:

1. Close open ends of piping with at least 8-inch thick, brick masonry or concrete bulkheads.
2. Close open ends of piping with threaded metal caps, plastic plugs, concrete, or other acceptable methods suitable for size and type of material being closed. Usage of wood plugs is prohibited.
3. All storm pipes to be abandoned are to be to be filled with low strength mortar, concrete, or non-shrink grout unless noted otherwise.

B. Abandoned structures: excavate around structure as required and use one procedure below:

1. Remove structure and close open ends of remaining piping

2. Remove top of structure down to at least 36 inches below final grade.
3. Fill to within 12 inches of top with stone, rubble, gravel, or compacted dirt.
4. Fill to top with concrete, or Low Strength Mortar (LSM).
5. Backfill to grade according to Section 312333.
6. Existing catch basins that are to be abandoned in place shall be filled with low strength mortar (LSM).

3.9 FIELD QUALITY CONTROL

C. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.

1. In large, accessible piping, brushes and brooms may be used for cleaning.
2. Place plug in end of incomplete piping at end of day and when work stops.
3. Flush piping between manholes and other structures to remove collected debris, if required by authorities having jurisdiction.

D. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from, or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory. Provide owner and/or construction manager that the storm sewer piping system has been installed with no defects (as mentioned above).

END OF SECTION 33 40 00

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SECTION 33 41 16 - SUBDRAINAGE PIPING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Work included in this section relates to all pipe, fittings, materials, and appurtenances related to underground subdrainage.

1.2 SUBMITTALS

A. Submit shop drawings prior to ordering materials for review.

B. Provide shop drawings for the following:

1. Underdrain pipe
2. Impermeable liner

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

A. Pipe materials in this article have perforated walls and typically are joined with loose joints.

B. Perforated PE pipe and fittings:

C. Perforated PVC SDR 35 sewer pipe and fittings: ASTM D 2729, gasketed bell-and-spigot ends.

D. Solid wall PVC pipe, ASTM D 3034

E. Solid wall PE pipe, AASHTO M252, or AASHTO M294, type S

2.2 SOIL AND GRANULAR MATERIALS

A. Materials are specified in Section 31 23 33.

2.3 GEOTEXTILE FABRIC

A. Materials are specified in Section 31 32 19

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.

B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Excavating, earthwork, trenching, and backfilling are specified in Division 31.

3.2 FOUNDATION, PAVEMENT AND CURB DRAINAGE INSTALLATION (where applicable).

A. Refer to plan details.

B. Where applicable, tie foundation drains with PVC or HDPE pope (or equal) using positive slope (0.5% min.) to nearby storm sewers or storm structure impervious

C. Place impervious fill material on sub-grade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches (150 mm) deep and 12 inches (300 mm) wide.

D. Install flat-style non-woven geotextile filter fabric in trench and overlap trench sides.

E. Place supporting layer of drainage course over compacted sub-grade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

F. Where shown on plan details encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections per manufactures requirements.

G. Add drainage course to width of at least 6 inches (150 mm) on side away from wall and to top of pipe to perform tests.

H. After satisfactory testing, cover drainage piping to width of at least 6 inches (150 mm) on side away from footing and above top of pipe to within 12 inches (300 mm) of finish grade.

I. Install drainage course and wrap top of drainage course with flat-style non-woven geotextile filter fabric overlapping edges at least 4 inches (100 mm).

J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Final backfill to finish elevations and slope away from building where applicable.

3.3 LANDSCAPING DRAINAGE INSTALLATION (Where applicable. Refer to Landscape Drawings.)

A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

B. Lay flat-style non-woven geotextile filter fabric in trench and overlap trench sides (min 4 inches).

C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches (100 mm).

D. Install drainage conduits as indicated in part 3 "piping installation" article for landscaping subdrainage with horizontal distance of at least 6 inches (150 mm) between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with tape.

E. Add drainage course to top of drainage conduits.

F. After satisfactory testing, cover drainage conduit to within 12 inches (300 mm) of finish grade.

G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.

H. Place layer of non-woven geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches (100 mm).

I. Fill to grade: place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding 6 inches (150 mm). Thoroughly compact each layer. Fill to finish grade.

3.4 PIPING INSTALLATION

A. Show relationships of piping and other materials on drawings.

B. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.

C. Miscellaneous (where applicable):

1. Underslab subdrainage: install piping level.

2. Foundation subdrainage: I nstall piping level and with a minimum cover of 36 inches unless otherwise indicated.

3. Retaining-wall subdrainage: when water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.

4. Landscaping subdrainage: install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches unless otherwise indicated.

5. Lay perforated pipe with perforations facing down.

6. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

D. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

E. Install thermoplastic piping according to ASTM D 2321.

3.5 PIPE JOINT CONSTRUCTION

A. Join perforated pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.

B. Join perforated PVC sewer pipe and fittings according to ASTM D 3212 with loose bell-and- spigot, push-on joints.

C. Special pipe couplings: join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.6 BACKWATER VALVE INSTALLATION (Where applicable)

A. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.

B. Backwater valves must be accessible for maintenance. Detail backwater valves and manholes or pits if backwater valve's check valve cannot be reached from the surface.

C. Install horizontal backwater valves in piping in manholes or pits where indicated.

3.7 CLEANOUT INSTALLATION

A. Where applicable, cleanouts for foundation, retaining-wall and landscaping subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

2. In vehicular-traffic areas, use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [18 by 18 by 12 inches (450 by 450 by 300 mm)] deep. Set top of cleanout flush with grade.

3. In non-vehicular-traffic areas, use NPS 4 (DN 100) cast-iron pipe and fittings for piping branch fittings and riser extensions to cleanout. Where applicable, set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches (300 by 300 by 100 mm) deep. Set top of cleanout 1 inch (25 mm) above grade.

4. Comply with requirements for concrete specified. Use Fc' = 3000 psi concrete. Use air entrainment when concrete is exposed to freeze/thaw conditions.

B. Cleanouts for underslab subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.

2. Use NPS 4 (DN 100) cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab

3.8 CONNECTIONS

A. Contract Documents indicate general arrangement of piping, fittings, and specialties.

B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

C. Where required, connect low elevations of foundation and underslab subdrainage to stormwater sump pumps.

3.9 FIELD QUALITY CONTROL

A. Tests and inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.

2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. If piping does not pass inspections and tests, the Contractor is to correct issues at no extra cost to the Owner.

D. Prepare test and inspection reports.

3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 33 41 16

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Appendix D

Title VI Requirements

The City of Canton, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat.252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity, for which the Recipient receives Federal financial assistance from DOT, including the City of Canton.

Please also review Appendix A, Appendix C, Appendix D and Appendix E of the Standard Assurances which are included in the following pages.

APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, ***The City of Canton*****,** as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part21. ***{Include City of Canton specific program requirements.]***

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin. ***{Include City of Canton specific program requirements.]***

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or ***The City of Canton)*** to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or ***The City of Canton)*****,** as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non• discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or ***The City of Canton*** may determine to be appropriate, including, but not limited to:

   a. withholding payments to the contractor under the contract until the contractor complies; and/or
   b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or ***The City of Canton*** may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

APPENDIX C

CLAUSES FOR TRANSFER OF REAL PROPERTY ACQUIRED OR IMPROVED UNDER THE ACTIVITY, FACILITY, OR PROGRAM

The following clauses will be included in deeds, licenses, leases, permits, or similar instruments entered into by the ***(Title of Recipient)*** pursuant to the provisions of Assurance 7(a):

A. The (grantee, lessee, permittee, etc. as appropriate) for himself/herself, his/her heirs, personal representatives , successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that:

1. In the event facilities are constructed, maintained, or otherwise operated on the property described in this (deed, license, lease, permit, etc.) for a purpose for which a U.S. Department of Transportation activity, facility, or program is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee, lessee, permittee, etc.) will maintain and operate such facilities and services in compliance with all requirements imposed by the Acts and Regulations (as may be amended) such that no person on the grounds of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities.

B. With respect to licenses, leases, permits, etc., in the event of breach of any of the above Non-discrimination covenants, *(Title of Recipient)* will have the right to terminate the (lease, license, permit, etc.) and to enter, re-enter, and repossess said lands and facilities thereon, and hold the same as if the (lease, license, permit, etc.) had never been made or issued.*

C. With respect to a deed, in the event of breach of any of the above Non-discrimination covenants, the ***(Title of Recipient)*** will have the right to enter or re-enter the lands and facilities thereon, and the above described lands and facilities will there upon revert to and vest in and become the absolute property of the *(Title of Recipient)* and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

APPENDIX D

CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by ***(Title of Recipient)*** pursuant to the provisions of Assurance 7(b):

A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination, (3) that the (grantee, licensee, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.

B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non- discrimination covenants, ***(Title of Recipient)*** will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.*

C. With respect to deeds, in the event of breach of any of the above Non-discrimination covenants, ***(Title of Recipient)*** will there upon revert to and vest in and become the absolute property of ***(Title of Recipient)*** and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

APPENDIX E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.,* 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.),* (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. §794 *et seq.),* as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.),* (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 - 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 etseq).

CANTON TITLE VI COMPLAINT PROCEDURE

I. FILING A COMPLAINT

Complaint Procedure - Any person who believes that he or she as a member of a protected class, has been discriminated against based on race, color, national origin, gender, age, disability, religion, low income status, or Limited English Proficiency (LEP) in violation of Title VI of the Civil Rights Act of 1964, as amended and its related statutes, regulations and directives, Section 504 of the Vocational Rehabilitation Act of 1973, Americans with Disabilities Act of 1990, as amended, the Civil Rights Restoration Act of 1987, as amended, and any other Federal nondiscrimination statute may submit a complaint. A complaint may also be submitted by a representative on behalf of such a person.

It is the policy of the City to conduct a prompt and impartial investigation of all allegations of discrimination and to take prompt effective corrective action when a claim of discrimination is substantiated.

No one may intimidate, threaten, coerce or engage in other discriminatory conduct against anyone because they have taken action or participated in an action to secure rights protected by the civil rights laws. Any individual alleging such harassment or intimidation may submit a complaint by following the procedure printed below.

Any individual who feels that he or she has been discriminated against may submit a written or verbal complaint to the designated Title VI Coordinator. A complaint must include the name, address and telephone number of the individual making the complaint (complainant) and a brief description of the alleged discriminatory conduct including the date of harm. An individual submitting a complaint alleging discrimination may include any relevant evidence, including the names of witnesses and supporting documentation.

Complaints should be directed to the Title VI Coordinator:

_____
Fonda Williams
Deputy Mayor
218 Cleveland Ave S.W., 8th floor
Canton, Ohio 44702
Phone - 330-438-4302
Email – fonda.williams@cantonohio.gov

Within 60 days of the receipt of the complaint the City will conduct an investigation of the allegation based on the information provided and issue a written report of its findings to the complainant. The City will try to obtain an informal voluntary resolution to all complaints at the lowest level possible.

A complainant's identity shall be kept confidential except to the extent necessary to conduct an investigation. All complaints shall be kept confidential.

These procedures do not deny the right of any individual to file a formal complaint with any government agency or affect an individual's right to seek private counsel for any complaint alleging discrimination.

Complaints may also be filed with the following government agencies:

Ohio Department of Transportation
Office of Equal Opportunity
1980 West Broad Street
MS: 3270
Columbus, OH 43223

The U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Ohio Civil Rights Commission
Central Office
Rhodes State Office Tower
30 East Broad Street, 5th floor
Columbus, OH 43215
614-466-2785

Ohio Civil Rights Commission
Akron Regional Office
Bradley S. S. Dunn, Regional Director
Akron Government Bldg.
161 S. High Street, Suite 205
Akron, OH 44308
(330) 643-3100

Link to filing a complaint online with the Ohio Civil Rights Commission:

https://crc.ohio.gov/FilingaCharge/ChargeFilingProcedure.aspx

II. COMPLAINT PROCESSING

The Title VI Coordinator will review the complaint upon receipt to ensure that all required information is provided, the complaint meets the filing deadline date which is 180 days from the date the alleged discriminatory act occurred, and falls within the jurisdiction of the City.

The Title VI Coordinator will then investigate the complaint. If the complaint is against the City then the Mayor's office or their designee will investigate the complaint. Additionally, a copy of the complaint will be forwarded to the City Law Director.

If the complaint warrants a full investigation, the Complainant will be notified in writing by certified mail. This notice will name the investigator and/or investigating agency.

The party alleged to have acted in a discriminatory manner will also be notified by certified mail as of the complaint. This letter will also include the investigator's name and will request that this party be available for an interview.

Any comments or recommendations from legal counsel will be reviewed by the Title VI Coordinator, Director of Public Service and Mayor's office.

Once the City has investigated the report findings, the City will adopt a final resolution.
All parties associated with the complaint will be properly notified of the outcome of the City's investigative report.

If the complainant is not satisfied with the results of the investigation of the alleged discriminatory practice(s), she/he shall be advised of their right to appeal the City's decision.

Appeals must be filed within 180 days after the City's final resolution. Unless new facts not previously considered come to light, reconsideration of the City's determination will not be available.

The foregoing complaint resolution procedure will be implemented in accordance with the Department of Justice guidance manual entitled "Investigation Procedures Manual for the Investigation and Resolution of Complaints Alleging Violations of Title VI and Other Nondiscrimination Statues," available online at:

http://www.justice.gov/crt/about/cor/Pubs/manuals/complain.pdf

Title VI Complaint Filing

Complaints filed with the City of Canton, Ohio based on violations of Title VI of the Civil Rights Act of 1964, must include the following information:

· Name of Complainant
· Date of Complaint

· Address of Complainant

· Telephone Number of Complainant

· Name of Agency / Department Accused of Discriminatory Practices

· Name of Individual Accused of Discriminatory Practices

· Address of Agency

· Date of Alleged Discrimination

· Description of Alleged Discrimination (see below)

11. Alleged Discrimination - If your complaint is in regard to discrimination in the delivery of services or discrimination that involved the treatment of you by others by the agency or department indicated above, please indicate below the basis on which you believe these discriminatory actions were taken.
· Race / Color / Religion
· National Origin
· Age · Sex, Gender
· Disability · Income Status
· Explanation of Alleged Discrimination - Please explain as clearly aspossible what happened.
Provide the name(s) of witness(s) and others involved in the alleged discrimination. (Attach additional sheets if necessary and provide a copy of written material pertaining to your case.)
· Signature of Complainant · Date of Complaint

III. ENVIRONMENTAL JUSTICE

In accordance with Title VI of the Civil Rights Act of 1964, each Federal agency shall ensure that all programs or activities receiving Federal financial assistance that affect human health or the environment do not directly, or through other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin. Part of Title VI reads, “No person in the United States shall, on the ground of race, color, or national origin beexcluded

from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving Federal financial assistance."

The three fundamental environmental justice (EJ) principles are:
· To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations andlow-income populations;

· To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and

· To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations.

The City of Canton is committed to these three environmental justice principles in all work that the City performs.

IV. ADMINISTRATION – WORK PLAN

Pursuant to 23 CFR 200, the City of Canton has designated a Title VI Coordinator who is responsible for initiating, monitoring, and ensuring the City's compliance with Title VI requirements for the following work plan:

· Administer, coordinate and Implement the Title VI Program plan and distribute internally and externally via website and update annually as required.
· Ensure that Assurances are being used in contracts for federal projects.
· Attend Title VI training.
· Collect public involvement data.
· Review written Title VI complaints and ensure every effort is made to resolve complaints informally at the local or regional level and review and update the City's Title VI plan and procedures as required.
· Implement a plan that provides training to City Staff on the basic requirements of the Title VI implementation plan.

Title VI Coordinator:

_____
Fonda Williams
Deputy Mayor
218 Cleveland Avenue, S.W., 8th floor
Canton, Ohio 44702
Phone – 330-438-4302
Email - fonda.williams@cantonohio.gov

V. LIMITED ENGLISH PROFICIENCY (LEP) POLICY

On August 11, 2000, the President signed an executive order, *Executive Order 13166: Improving Access to Service for Persons with Limited English Proficiency (LEP)*, to clarify Title VI of the Civil Rights Act of 1964. It has as its purpose, to ensure meaningful access to programs and services to otherwise eligible persons who are not proficient in the English language. In addition, The US Department of Transportation published *Policy Guidance Concerning Recipients' responsibilities to Limited English Proficient Person* in the December 14, 2005 Federal Register.

This guidance outlines the following four factors that the City uses to access the LEP populations in Canton.

1. The number and proportion of LEP persons eligible to be served or likely to be encountered by the City.
2. The frequency with which LEP individuals come into contact with the program, activity or service.
3. The nature and importance of the program, activity, or service provided by the program.
4. The resources available to the City and costs.

Summary of the four factor analysis

Factor 1- The number and proportion of LEP persons eligible to be served or likely to be encountered by the City can only be estimated until the actual number of persons who can speak English less than "very well" are documented as needing assistance by City Staff . With this Title VI Plan being in early development stages and considered a document that may need regular updates, US Census Bureau information is being used at this time. The total population is provided below to shown general distribution of race and ethnicity in the community. The estimated number of persons that may not speak English "very well" is following in the US Census Bureau 2006-2010 American Community Survey.

The U.S. Census Bureau provides statistics from 2010 for the City of Canton as follows:
Total population = 74,451
Population by Ethnicity:
Hispanic or Latino = 1,805 Non Hispanic or Latino = 72,646
Population by Race:
White = 53,150 African American = 16,854, Asian = 193, American Indiana or Alaska Native = 372,
Native Hawaiian and Pacific Islander = 0, Other = 431, Identified by two or more = 3,451.

The US Census Bureau 2006-2010 American Community Survey 5-Year Estimates under SELECTED SOCIAL CHARACTERISTICS estimates the number of people in Canton who speak a language other than English to be 2,945 with those speaking English less than "very well" estimated at 1.0% or approximately 983 individuals who may be considered limited in English proficiency.

Factor 1(continued)-
According to the census numbers above there may be up to 983 individuals who live in the City of Canton that *may* be considered as LEP. Based on actual contact between City Staff and the community there have been very few requests from anyone in the service area asking the City to provide language translation services. Therefore, the LEP population is probably even less than the estimate shown above.

Factor 2- The frequency with which LEP individuals come into contact with the program, activity or service:
Due to the infrequent requests for translation services, there appears to be a minimal need for translation services from the City. This may be attributed to the high percentage of younger people (87.6% for ages up to 17) who are available as family members for translation services.

Factor 3. The nature and importance of the program, activity, or service provided by the program:
If at any time a LEP individual requests translation services that are considered important such that denial or delay of access or services or information could have serious or even life-threatening implications, the City will provide, upon request, services to assist the LEP population including translation of vital City documents and interpretation services.

Factor 4. The resources available to the City and costs:
The City of Canton currently has several staff members who are bilingual in English and Spanish and are available to translate requests from the Hispanic population on a day to day basis. The City also provides many of their outreach services in the predominate languages of the community, English and Spanish. In addition, certified translation services are available through LanguageLine Solutions, a telephone translation service that is accessible for phone line translations services 24 hours a day. These are services the City provides upon request as discussed in factor 3 above. Page | 12

Summary of LEP Accommodation Plan
· The City of Canton strives to serve its population to the best of its ability and will provide upon request, services to assist the LEP population including translation of vital documents and interpretation services deemed necessary to provide meaningful access to City services.
· A U.S. Census Bureau ISpeak card is available as part of this document and on the City's webpage and is also available at City Hall located at 414 Main Street. This card allows LEP individuals to communicate their preferred language to City Staff whereas City Staff may then access a translation service called LanguageLine, phone number 1-800-752-6096 is available to City Staff or other translation services may be used as determined by the City.
· For language translation requests from the Hispanic or Latino community the City has several staff member who are bilingual and are available to provide translation services on a day to day basis.
· The City of Canton utilizes a voluntary public involvement survey to collect information regarding persons affected by proposed projects. The survey permits respondents to remain

anonymous, while voluntarily answering questions regarding their gender, ethnicity, race, age, sex, disability status, and household income. This voluntary public involvement survey is available at all public hearings and meetings. Once the survey data has been collected, it will be reviewed and then the survey will be placed in a file for future reference. In the case enough surveys are collected over time to show a significant increase in LEP populations, the City may consider changes to their LEP policy. Completed surveys shall be retained for a period of three years from the date of the meeting and/or completion of the related project, if applicable. See Appendix G for a sample of this Survey.

· The City reviews written Title VI complaints and ensures every effort is made to resolve complaints informally at the local or regional level and review and update the City's Title VI plan and procedures as required.

· Staff for the City will be provided training on the requirements for providing meaningful access to services for LEP persons. Considering the relatively small size of the City of Canton and limited financial resources, current training may be limited to web access to this document and it's attachments by all City Staff, a log showing the names of all Staff that have been made aware of this document (sign off that they have read the document) and require that all new employees receive the same training.

Signature and Proposal Pages

Signature Page
COLLECTION SYSTEMS SERVICE CENTER GARAGE ADDITION AND ADMINISTRATION AREA RENOVATION PROJECT

To the Director of Public Service of the City of Canton:

The undersigned, having carefully examined the complete invitation to bid, herewith proposes to furnish all the labor and materials required to complete the **COLLECTION SYSTEMS SERVICE CENTER GARAGE ADDITION AND ADMINISTRATION AREA RENOVATION PROJECT** in accordance with the specifications on file, including any and all work and materials that may be necessary to complete the project in a proper and workmanlike manner, and in accordance with the instructions in the bid packet and under the direction of and to the satisfaction of the Director of Public Service of said City.

The bidder hereby agrees that the Director of Public Service has the right to reject any and all bids and to accept the bid(s) deemed most beneficial to the City of Canton.

The bidder hereby certifies that the undersigned _____ is the only person interested in the bid and the bidder herewith certifies that no officer or employee of the City of Canton is in any manner interested therein.

The bidder herewith encloses a _____**(BID BOND, CERTIFIED/CASHIER'S CHECK)** in the sum of $ _____ dollars made payable to the CITY OF CANTON as a guaranty that if awarded the contract for the work included in the proposal, _____ will enter into contract therefore, with sureties satisfactory to the Director of Public Service, within the prescribed time of ten (10) days from the date of service of notice of award, otherwise such bond or checks shall become the property of said City, as liquidated damages of the failure on the bidder's part to do said contract within the specified time.

The bidder acknowledges receipt of Addenda Numbers: _____.

SIGNATURE OF BIDDER: _____.

NOTE: If bidder is a corporation, set forth the legal name of the corporation, together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If bidder is a partnership, set forth the name of the firm, together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

Proposal Page

We (I), the above signed hereby propose to furnish the following article(s) and/or service(s) at the price(s) and terms stated subject to all instructions, conditions, specifications, and all attachments hereto. We (I) have read all attachments including the specifications and fully understand what is required.

BID ITEM	SPEC ITEM	DESCRIPTION	QTY	UNIT	PRICE LABOR	PRICE MATERIAL		TOTAL
CITY OF CANTON COLLECTION SYSTEMS SERVICE CENTER GARAGE ADDITION AND ADMINISTRATION AREA RENOVATION								
Base Bid	ALL	Perform all General Contract work as outlined in Project Manual and as shown on Drawings	1	Lump				
Allowance		General Contractor to include General Purpose Construction Allowance.	1	Lump				$40,000
Alternate No. 1		Alternate Bid amount to remove existing gas line and replace with new gas line from meter to generator, due to possible conflict with subgrade elevation at new parking spaces.	1	Lump				
		PROJECT TOTAL						
Unit Price		Unit price to remove and dispose of one (1) cubic yard of unsuitable soil and debris	1	C.Y.				
Unit Price		Unit price to furnish and install one (1) cubic yard of engineered site fill material	1	C.Y				

Bid Price in Figures _____ **FROM:** _____

_____

Bid Price in Words _____ _____

_____

Base Bid Prices are for Informational Purposes Only.
Total Unit Prices will govern.