



The City of Canton

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# Invitation to Bid

**City of Canton, Ohio**  
Purchasing Department  
218 Cleveland Ave. SW, 4<sup>th</sup> floor  
Canton, Ohio 44702

Canton Water Department NE Water Treatment Plant High Service Pump  
#3 & VFD Upgrades

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**Item/Project**

Water Department

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**Responsible Department**

2:00 PM, 11/15/2023

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**Bids Due**

**Bid Proposal Submitted By:**

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**Company Name**

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**Street Address**

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**City**

**State**

**Zip**

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**Contact Person**

**Phone No.**

**Email Address**



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**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.



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### Legal Notice

Sealed bids will be received by the City of Canton (the "City"), as provided in this notice for the Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades Project (the "Project"), Ordinance 134/2023. 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 "Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades PROJECT BID." Bids will be received on or before 2:00 PM, local time, 11/15/2023 and opened shortly thereafter.

Questions regarding plans and specifications should be addressed in writing to Purchasing Department, at [purchasing@cantonohio.gov](mailto: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 October 31 and November 7, 2023



**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



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- 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:

**Brent Burrier**

2. The Design Engineer for the Project is:

Burgess & Niple, Inc.  
100 West Erie Street  
Painesville, Ohio 44077

### 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 **Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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 NA at NA.**

### E. WORK

1. This Project includes **Waterwork and electrical**, and the like as set forth in the Contract Documents.
2. Alternate No. 1 for this Project is **NA.**



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3. Alternate No. 2 for this Project is **NA**.
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 **Brent Burrier**, The City of Canton, at **[brent.burrier@cantonohio.gov](mailto:brent.burrier@cantonohio.gov)** or **330-438-6569** 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 **\$562,300.00**.

The estimated cost for Alternate 1 - **NA** is: **NA**.

The estimated cost for Alternate 2 - **NA** is: **NA**.

### 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.



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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 PM, local time, on 11/15/2023.

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.





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- 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



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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:

**NA**

- 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.
- c. If Contractor intends to work with any pesticides or herbicides to perform the contracted work, the City of Canton requires that Contractor be in possession of an up-to-date and valid Commercial Pesticide Applicator's License from the Ohio Department of Agriculture.

## 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



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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.



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- 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.



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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.



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- I. 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 three 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. Additional Post-Bid Submittals



## The City of Canton

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- a) Affidavit as to Personal Property Taxes. 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;



## The City of Canton

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- 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 11/8/2023, 2:00 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](mailto: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.



## The City of Canton

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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:

543 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



## The City of Canton

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(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.



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**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:

**10%**

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.



## The City of Canton

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.



## The City of Canton

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- 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.



## The City of Canton

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- 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 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 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.



## The City of Canton

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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





The City of Canton

**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:** 134/2023

**Alternates:** \_\_\_\_\_

**Contractor:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_, 0

Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_

**Project: Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades**

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. Project Labor Agreement (if applicable)
- J. Addenda issued;
- K. Contractor's Personal Property Tax Affidavit (O.R.C. 5719.042);
- L. Statement of Claim Form; and
- M. 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.
- N.  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.
- O. Project Labor Agreement (if applicable)

**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



## The City of Canton

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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).

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**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:  
**Burgess & Niple, Inc.**  
**100 West Erie Street**  
**Painesville, Ohio 44077**



**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 **543 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**

<u>Original Contract Amount</u>	<u>Dollars Per Day</u>
\$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**

<u>Original Contract Amount</u>	<u>Dollars Per Day</u>
\$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 **\$0.00**, 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: **\$0.00** (Lump Sum Bid); and

**4.2** Accepted Alternates, included in the Contract Sum:

<b>Alternate No.</b>	<b>Description</b>	<b>Amount</b>
1	NA	
2	NA	

**4.3** Allowances included in the Contract Sum:

<b>Allowance Description</b>	<b>Amount</b>
Allowance #1: Pump Service Company	
Allowance #2: System Integrator	

**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.



## The City of Canton

### **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.



## The City of Canton

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- .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 or Davis Bacon rates and requirements.

**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.



The City of Canton

**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: \_\_\_\_\_



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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





The City of Canton

**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 **Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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



**The City of Canton**

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 and 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 obligee, 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 **Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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)

\_\_\_\_\_  
(SURETY)

By: \_\_\_\_\_

By: \_\_\_\_\_

Printed Name & Title: \_\_\_\_\_

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 **Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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.



## The City of Canton

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### 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



## The City of Canton

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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



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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





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**CONTRACTOR'S QUALIFICATION STATEMENT**

**Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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: Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades 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:



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- 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



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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



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- 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-subsiidiary).

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]



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**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



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### **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>



**ODOT MANUAL SUPPLEMENT**

This Supplement shall apply where and to the extent that the State of Ohio Department of Transportation Construction and Material Specifications, in the current version as of January 1, 2019, is expressly incorporated into the Contract Documents via the Owner-Contractor Agreement, or when designated as a Contract Document in the list of Contract Documents in the Owner-Contractor Agreement, or is referenced anywhere else in the Contract Documents as one of the Contract Documents.

1. **Regardless of any terms to the contrary in Division 100 or elsewhere, any directions or orders of the Engineer that will result in an adjustment of the Contract Price or the Contract Time shall require the prior written approval of the Owner. It is expressly understood and agreed that the Engineer does not have authority to authorize changes or modifications in the Contract Price or Contract Time.**
2. The Contractor's obligations under this ODOT Supplement are in addition to and not in limitation of its other obligations under the Contract Documents.
3. Delays. Regardless of the terms in this ODOT Supplement, including Item 109.05, all time adjustments shall be subject to a) filing a Change Proposal and / or Claim in accordance with Articles 11 and 12 of the Modified Standard General Conditions **of the Contract for Construction (EJCDC C-700, 2013 edition) ("Modified Standard General Conditions")**, b) substantiating the Contractor's entitlement to a time adjustment in accordance with the Modified Standard General Conditions and c) Item 109.05. The Contractor will be entitled to additional compensation for delays but only for those delays described in the Modified Standard General Conditions. As part of the Claims process and as a condition precedent to receiving any additional compensation, the Contractor shall prepare a cost analysis as allowed by Item 109.05.D substantiating its entitlement to additional compensation.
4. Division 100, General Provisions. The following Division 100 General Provisions of the State of Ohio Department of Transportation, Construction Specifications Manual in the current version as of January 31, 2019, are incorporated in this ODOT Supplement, subject to any changes or limitations herein.
  - a. **Item 101.01, General.**
  - b. Item 101.02, Abbreviations, provided that references to DCA, DDD, DET, DGE shall mean the Owner.
  - c. Item 101.03, Definitions, provided where terms that are defined in the other Contract Documents, the definition in the other Contract Documents shall control, and further provided that the following definitions are deleted, modified and/or added:
    - i. Claims is deleted
    - ii. Contract Bond is deleted.
    - iii. Contract Documents is deleted.
    - iv. Contract Price is deleted.
    - v. Contract Time is deleted.
    - vi. Contractor is deleted.
    - vii. Department shall mean the Owner.
    - viii. Director shall mean the Owner's representative.
    - ix. Disputes is deleted.
    - x. Engineer is deleted.





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- xi. Extra Work Contract is deleted.
- xii. Final Acceptance shall mean Final Completion as defined in the Owner Contractor Agreement.
- xiii. Final Inspector shall mean the Owner.
- xiv. Laboratory is deleted.
- xv. Prebid Question is deleted.
- xvi. Proposal Guaranty is deleted.
- xvii. Questionnaire is deleted.
- xviii. Shop Drawings is deleted.
- xix. Signatures on Contract Documents is deleted.
- xx. State or state shall mean the Owner.
- xxi. Subcontractor is deleted.
- xxii. Work is deleted.
- d. **Item 101.04, Interpretations.**
- e. Item 103.03, Cancellation of Award.
- f. Item 104.02.D.2, Significant Changes in the Character of the Work (including Tables 104.02-1 and 104.02-2 following this Item), provided that all references to Item 108 and 109.12 are deleted and that all time adjustments shall be subject to filing a Change Proposal and / or Claim in accordance with the Modified Standard General Conditions and substantiating the entitlement to an extension of time as provided in the Modified Standard General Conditions (EJCDC Document C-700, 2013 edition) ("Modified Standard General Conditions").
- g. Item 104.03, Rights in and Use of Materials Found on the Work.
- h. Item 104.04, Cleaning Up.
- i. Item 105.02, Plans and Working Drawings, provided that the review of submittals may be by the Owner or the Engineer in the Owner's discretion.
- j. Item 105.06, Superintendent.
- k. Item 105.10, Inspection of Work.
- l. Item 105.11, Removal of Defective and Unauthorized Work.
- m. Item 105.12, Load Restrictions.
- n. Item 105.13, Haul Roads, provided that the second paragraph in this Item is deleted. The Contractor shall be responsible for any damage to the roads referred to in the second paragraph.
- o. Item 105.14, Maintenance During Construction, except substitute "Final Completion" for "Final Inspector accepts the work under 109.12" and delete the remainder of the first sentence. Additionally, delete the second to last sentence in this Item.
- p. Item 105.15, Failure to Maintain Roadway or Structure.
- q. Item 105.16, Borrow and Waste Areas.
- r. Item 105.17, Construction and Demolition Debris.
- s. Item 106.01, Source of Supply and Quality Requirements.
- t. Item 106.02, Samples, Tests and Cited Specifications, provided that this Item will be optional at the discretion of the Owner. If the Owner elects to proceed under this Item, a) the Contractor



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without additional cost will provide material samples as required by the Owner, and b) the Owner may conduct such tests as it determines proper.

- u. **Item 106.03, Small Quantities and Materials for Temporary Application.**
- v. **Item 106.04, Plant Sampling and Testing Plan.**
- w. **Item 106.05, Storage of Materials.**
- x. **Item 106.06, Handling Materials.**
- y. **Item 106.07, Unacceptable Materials, except substitute the word “unacceptance” in the third sentence with the word “unacceptable.”**
- z. **Item 106.08, Department-Furnished Material.**
- aa. **Item 106.09, Steel and Iron Products Made in the United States.**
- bb. **Item 107.01, Laws to be Observed.**
- cc. **Item 107.02, Permits, Licenses, and Taxes.**
- dd. **Item 107.03, Patented Devices, Materials, and Processes.**
- ee. **Item 107.05, Federal-Aid Provisions.**
- ff. **Item 107.06, Sanitary Provisions.**
- gg. **Item 107.07, Public Convenience and Safety.**
- hh. **Item 107.08, Bridges Over Navigable Waters.**
- ii. **Item 107.09, Use of Explosives, provided that both bringing explosives onto the site and any use of explosives shall require the prior written approval of the Owner.**
- jj. **Item 107.10, Protection and Restoration of Property, provided that the Contractor shall remain responsible for all damage and injury to property until the Project is Finally Complete, and all references to Items 109.11 and 109.12 are deleted.**
- kk. **Item 107.11, Contractor’s Use of the Project Right-of-Way or Other Department-Owned Property, provided the reference to Item 109.12 is deleted.**
- ll. **Item 107.12, Responsibility for Damage Claims and Liability Insurance, provided that all notices and certificates shall be delivered to the Owner’s representative and, if there is no Owner’s representative, to the Engineer. Reference to the “State of Ohio, Department of Transportation” shall mean the Owner.**
- mm. **Item 107.13, Reporting, Investigating, and Resolving Motorist Damage Claims, provided that this item is modified to read, “When a motorist reports damage to its vehicle either verbally or in writing to the Contractor, the Contractor shall within 3 days make and file a written report to the Owner and the Engineer and also file a report with its insurance carrier”.**
- nn. **Item 107.14 Opening Sections of Project to Traffic, provided that the reference to Item 108.06 is deleted.**
- oo. **Item 107.15, Contractor’s Responsibility for Work, provided that reference to “Final Inspection according to 109.12.A” shall mean “Final Completion.” and all references to Item 108 are deleted.**
- pp. **Item 107.17, Furnishing Right-of-Way.**
- qq. **Item 107.19, Environmental Protection, provided that the Owner makes no representation as to having acquired any permits unless expressly provided in the Contract Documents. The Contractor will comply with any permits obtained by the Owner.**
- rr. **Item 107.20, Civil Rights.**



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- ss. Item **107.21, Prompt Payment.**
- tt. **with information or reports on DBE participation unless the Contract Documents otherwise require such reports or information. Additionally, unless otherwise provided in the Contract Documents, the 50% self-contracting requirement in the first sentence is waived.**
- uu. Item **108.04, Limitation of Operations.**
- vv. Item **108.05, Character of Workers, Methods, and Equipment.**
- ww. Item **108.10, Payroll Records.**
- xx. Item 109.01, Measurement of Quantities, provided that this item will apply only where payment is to be based on the measurement of quantities.
- yy. Item 109.02, Measurement Units.
- zz. Item 109.03, Scope of Payment.
- aaa. Item **108.01, Subletting of the Contract, provided that the Contractor need not provide the Owner (Reserved.)**
- bbb. Item 109.05, Extra Work as modified in this Supplement, provided that a) the references to Items 105.07, 105.10 and 108 are deleted, b) all negotiated prices shall require the Owner's written approval, c) the Owner must approve in writing any directions or orders by the Engineer to proceed with force account work, d) in Item 109.05.B.2 the reference to Department shall mean the Ohio Department of Transportation, e) the compensation provided in 109.05.B through 109.05.D constitutes payment in full for all the items referred to in Items 109.05.C.1-10, except for any additional compensation for delays, f) the mark-ups provided in Items 109.05.D.2.b and 109.05.D.2.d are deleted, and g) Item 109.05.D.2.f regarding home office overhead is deleted. The Contractor's entitlement to home office overhead, if any, shall be subject to current Ohio law.
- ccc. **109.06, Directed Acceleration.**
- ddd. **(Reserved.)**
- eee. **109.08, Unrecoverable Costs.**
5. Divisions 200 through 700. Divisions 200 through 700 of the State of Ohio Department of Transportation, Construction Specifications Manual in the current version as of January 31, 2019 are incorporated in this ODOT Supplement.
- a. All references to Division 100 Items in Divisions 200 through 700 shall be to the Division 100 Items as modified in this Supplement.
- b. Where Division 100 Items are referred to in Divisions 200 through 700 but are not included in this Supplement, the deleted references will be governed by this Paragraph 5.
- c. In Item 203.04, the reference to Item 108.06 shall be governed by Paragraph 3, Delays, in this Supplement.
- d. In Item 514.24, the reference to Item 109.10 shall be governed by the payment provisions in the Modified Standard General Conditions.
- e. In Item 624.04, the reference to item 109.09 shall be governed by the payment provisions in the Modified Standard General Conditions, i.e., the Owner will process and make payments in accordance with the provisions in the Modified Standard General Conditions. In this regard, the basis for payment of mobilization costs will be as provided in Item 624.04.
- f. General to Divisions 200 through 700. The basis for payment provided in the Basis for Payment items in these Divisions shall be the basis for payment to the Contractor when applicable.



## 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 1<sup>st</sup> to October 1<sup>st</sup>; 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.



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- 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 and which require bidding pursuant to Ohio R.C. 735.05 through 735.09 and Ohio R.C. 737.03.  
(Ord. 137/2023. Passed 9-25-2023.)

### 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



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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.)*



## The City of Canton

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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 or 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 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.)*



The City of Canton

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**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.





The City of Canton

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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: \_\_\_\_\_

Date: \_\_\_\_\_

**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.



The City of Canton

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End of Instructions



The City of Canton

**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:

<u>County</u>	<u>Amount</u> (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\_\_



The City of Canton

**CONTRACTOR’S FINAL WAIVER & RELEASE AFFIDAVIT  
("AFFIDAVIT")**

Project: **Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades**

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.

_____	State of: _____ County of _____
Company Name	
_____	Subscribed and sworn to before me this _____
Authorized Signature (Company Officer)	day of _____
_____	Notary Public: _____
Title	My Commission Expires: _____
_____	
Date	

**CITY OF CANTON**  
**Canton Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades**  
**Project**

**PRE-BID SUBSTITUTION FORM**



The City of Canton

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 ONLY A SAMPLE PLA. THE PLA FOR THE NE WATER  
TREATMENT PLANT HIGH SERVICE PUMP #3 & VFD UPGRADES  
WILL BE PROVIDED TO THE AWARDED BIDDER.**

**PROJECT LABOR AGREEMENT**

**FOR THE**

**31<sup>ST</sup> ST. N.E. WATERLINE REPLACEMENT & STORM SEWER PROJECT - GP 1398**

**BETWEEN**

**CITY OF CANTON**

**AND**

**EAST CENTRAL OHIO BUILDING AND CONSTRUCTION**

**TRADES COUNCIL AFL-CIO**

**AND**

**SIGNATORY LOCAL UNIONS**

**Effective \_\_\_\_\_**

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**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 (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 31<sup>st</sup> Street N.E. Waterline Replacement & Storm Sewer Project, GP - 1398 (hereinafter "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, reconstruction, repair, 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. Prior to performing any work on the Project, all Contractors of whatever tier shall execute the Letter of Assent (attached as Appendix 1) *and* participate in a Pre-Job Conference as required by Article VIII, Section 4 of this Agreement. 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 any on-site construction, reconstruction, repair, and renovation work required to complete the Project, unless such work is specifically excluded by Article IV, Section 2 of this Agreement. 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 parties to this Agreement understand and acknowledge that this Project is important to maintain and improve the City's infrastructure, and to the safety and welfare of City residents, employees, and visitors.

The location of the Project will encompass and affect the general area in and around the City of Canton's 31<sup>st</sup> Street NE, from Harmont Avenue NE to Coventry Boulevard NE, and Coventry Boulevard NE from 31<sup>st</sup> Street NE to 30<sup>th</sup> Street NE. The Project directs the replacement and installation of new waterlines and storm sewers. It will also require roadway reconstruction within and around the affected area, and related appurtenances including but not limited to curbs, ADA-compliant ramps, driveway aprons, and related paving and concrete work.

The Project Cost is estimated to be \$1,300,000.00 and is planned to be let out for bid by the end of August 2023.

**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, recognition 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. 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, reconstruction, repair, and renovation work required to complete 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 (j) 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 that* any and all Contractors are willing, ready and able to execute and comply with this Agreement should such Contractor be awarded work covered by this Agreement.
- (b) All Contractors, as a condition to awarding any contract or subcontract for any work covered by this Agreement, shall obtain and deliver to the Council a Letter of Assent (in the form provided by Appendix 1) executed by the awarded Contractor.
- (c) Where any Contractor violates the above Section 3(b), such Contractor and subcontractor shall be jointly and severally liable for damages incurred by any affected Union(s) from such failure of the Contractor to properly bind a subcontractor to the Agreement by Letter of Assent, determined pursuant to the Grievance Procedure set forth in Article VII of this Agreement.
- (d) Notwithstanding the foregoing Section 3(c), compliance with this Agreement is an absolute condition, as determined by the Owner, to performing any work on the Project unless such work is specifically excluded by Article IV, Section 2. Any Contractor performing work on the Project shall be deemed to have accepted this Agreement by such performance and agreed to be bound by all of its terms, without exception.

**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 by the procedure set forth in Article IV, Section 3. Contractors who are signatory to local area 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.

(b) 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 by 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 Council prior to commencing work which shall require completion of a Pre-Job Conference Verification Form (attached as Appendix 2). This Pre-Job Conference requirement may be waived only by the Council, in writing, upon request of a Contractor. 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 3, 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

[Signature]  
Director of Public Service

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

[Signature]  
PRESIDENT

APPROVED AS TO FORM

[Signature]  
CITY OF CANTON  
DIRECTOR OF LAW

BOILERMAKERS LOCAL NO. 744

By: [Signature]  
Name: MARTIN D. McHOD  
Title: BUSINESS MANAGER  
Date: 7.19.2023


BRICKLAYERS LOCAL 6

By: [Signature]  
Name: Justin M. Gortrell  
Title: Field Rep  
Date: 8-21-23


ELECTRICIANS LOCAL NO. 540

By: [Signature]  
Name: ERIK HANN  
Title: BUS. MGR. / F. S.  
Date: 7/19/23


**ELEVATOR CONSTRUCTORS  
LOCAL NO. 45**

By:   
Name: Ron Johnston  
Title: BM  
Date: 7/19/2023

**GENERAL TRUCK DRIVERS &  
HELPERS UNION LOCAL NO. 92**

By:   
Name: MARK M. NEW  
Title: ReC Sec  
Date: 7/19/23

**GLAZIERS LOCAL NO. 1162**

By:   
Name: Scott Herter  
Title: B.A.  
Date: 7-19-23

**HEAT & FROST INSULATORS AND  
ALLIED WORKERS LOCAL  
NO. 84**

By: Kevin Struby  
Name: Kevin Struby  
Title: Business Manager  
Date: 8-2-23


**IRONWORKERS LOCAL NO. 550**

By: Theron Hodge  
Name: Theron Hodge  
Title: Business Agent  
Date: 7-20-23


**LABORERS LOCAL NO. 1015**

By: Jake Craston Jr  
Name: JAKE Craston Jr  
Title: Business Manager  
Date: 7/24/23


**OPERATIVE PLASTERERS AND  
CEMENT MASONS LOCAL NO. 109**

By:   
Name: MARK Anderson  
Title: B.A.  
Date: 7/19/2023


**PAINTERS LOCAL NO. 841**

By:   
Name: Scott Harter  
Title: B.A.  
Date: 7-19-23

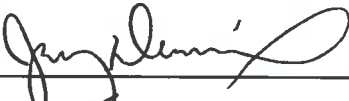
**PLUMBERS, PIPEFITTERS AND  
REFRIGERATION LOCAL NO. 94**

By:   
Name: Brett McElross  
Title: PM  
Date: 8-16-23

**ROOFERS LOCAL UNION NO. 88**

By:   
Name: James B. Moyers  
Title: Business Manager  
Date: 07/21/2023


**SHEET METAL WORKERS LOCAL  
NO. 33**

By:   
Name: JERRY DUREUX  
Title: BUSINESS AGENT  
Date: 7/19/23

**SPRINKLER FITTERS LOCAL  
NO. 669**

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_

**INDIANA/KENTUCKY/OHIO  
REGIONAL COUNCIL OF  
CARPENTERS**

By:   
Name: Kevin M. Ennis #  
Title: Senior Representative  
Date: 7/19/23

**APPENDIX 1**

**LETTER OF ASSENT TO THE PROJECT LABOR AGREEMENT  
FOR THE**

**31<sup>ST</sup> ST. N.E. WATERLINE REPLACEMENT & STORM SEWER PROJECT - GP 1398**

Pursuant to Article I, Section 1 and Article IV, Section 3 of the Project Labor Agreement (the "Agreement") for the above-referenced 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.

By executing this Letter of Assent, the undersigned also reaffirms, acknowledges, and agrees that it must participate in a Pre-Job Conference with the East Central Ohio Building & Construction Trades Council prior to performing any work on the Project. A Pre-Job Conference shall be valid only where the undersigned Contractor completes the Pre-Job Conference Verification Form provided in Appendix 2.

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 Letter of Assent will automatically terminate without further notice.

**For the Contractor (or Subcontractor of whatever tier)**

**Name of Contractor/Subcontractor:** \_\_\_\_\_

**By its Authorized Representative:** \_\_\_\_\_

**Print Name:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Phone:** \_\_\_\_\_

**Email:** \_\_\_\_\_

**APPENDIX 2**

**Pre-Job Conference Verification Form**

Date of Conference \_\_\_\_\_

Location of Conference \_\_\_\_\_

Project Name \_\_\_\_\_

Contractor Name \_\_\_\_\_

Address of Contractor \_\_\_\_\_

\_\_\_\_\_

Point of Contact \_\_\_\_\_

Phone \_\_\_\_\_

Email \_\_\_\_\_

Scope of Work \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contractor has provided Council with a list of all proposed trade assignments by craft including scope of work for each assignment.

Y\_\_\_ N\_\_\_

Contractor has provided Council with a list of all subcontractors that will perform work on the Project.

Y\_\_\_ N\_\_\_

Contractor affirms that it is responsible for subcontracting any work on the Project in strict compliance with Article IV, Section 3 of the Project Labor Agreement.

Y\_\_\_ N\_\_\_

The Council has in its possession a Letter of Assent signed by Contractor.

Y\_\_\_ N\_\_\_

**ACKNOWLEDGED:**

BY COUNCIL: (signature) \_\_\_\_\_ (title) \_\_\_\_\_

BY CONTRACTOR: (signature) \_\_\_\_\_ (title) \_\_\_\_\_

**APPENDIX 3**  
**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 Appendix 3.

**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

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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.

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(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 1<sup>st</sup> 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".

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(SIGNATURE)

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(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:
-------------------

Prevailing Wage Coordinator	Employee
Public Authority:	Name:
Name of PWC:	Street:
Street:	City:
City:	State/Zip:
State/Zip:	Phone:
	Email:
Phone:	Last 4 Digits of SS #:

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 and overtime:
			/
			/
			/
			/
			/
			/

Hourly fringe benefits paid on your behalf by this company (Yearly amount the **company pays** divided by 2080):

Fringe	Amount	Fringe	Amount
Health Insurance		Vacation	
Life Insurance		Holiday	
Pension		Sick Pay	
Other (Specify)		Training	
Other (Specify)		<b>Total Hourly Fringes *</b>	

Contractor's Signature:	Date:
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Employee's Signature:	Date:
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## 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 if 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](http://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:

- 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.
- Work Class:** List classification of work 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".
- 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.
- Project Total Hours:** Total the hours entered for pay period.
- 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.
  - 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.
  - Total rate may be paid as listed in prevailing wage rate schedule with total fringe amounts paid approved plans.
  - 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.
- Project Gross:** Enter total gross wages earned on the project for straight time and overtime. Project hours "X" base rate should equal project gross.
- 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.
- Total Hours All Jobs:** Total all hours worked during the pay period including non-prevailing wage jobs.
- Total Gross All Jobs:** Gross amount earned in the pay period for all hours worked.
- Self-explanatory.
- Self-explanatory.

# Certified Payroll Report

**Report for:**  Check if Subcontractor<sup>1)</sup> Contract No: \_\_\_\_\_ Payroll No: \_\_\_\_\_  
 Company:<sup>1)</sup> \_\_\_\_\_ If Sub, GC/Prime Contractor Name: \_\_\_\_\_ Project Name & Location: \_\_\_\_\_  
 Address: \_\_\_\_\_ Public Authority (Owner): \_\_\_\_\_ Week Ending: \_\_\_\_\_  
 City, State, Zip \_\_\_\_\_ Phone No: \_\_\_\_\_ Sheet:<sup>2)</sup> \_\_\_\_\_ of \_\_\_\_\_

1. Employee Name, Address, & SS# (Last 4 digits if permitted)	2. Work Class <sup>3)</sup>	3. Prevailing Wage Project		4. Total Hours	5. Base Rate	6. Project Gross	7. Fringes:			Fringe Rate Your Company Pays Per Hour			Weekly Payroll Amount					
		Hours Worked - Day & Date					Cash & Approved Plans	Approved Plans	H&W	Pens	Vac	Hol	Other	Total	8. Total Hrs for all Jobs	9. Total Gross on All Jobs	10. Total Deductions	11. Net Pay on All Jobs
	OT																	
	ST																	
	OT																	
	ST																	
	OT																	
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1) By signing below, I certify that: (1) I pay, or supervise the payment of the employees shown above; (2) 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; (3) the fringe benefits have been paid as indicated above; (4) no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in ORC Chapter 4115; and (5) apprentices are registered with the U.S. Dept. of Labor, Bureau of Apprenticeship and Training. I understand that the willful falsification of any of the above statements may subject the Contractor or Subcontractor to civil or criminal prosecution.

Type or Print Name and Title \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

11/14 jc 2) Attach additional sheets as necessary. 3) Type in continuous line, text will wrap.



DO NOT REDO FORM AND CHANGE RATES IF AN ERROR HAS BEEN MADE! SUBMIT A CORRECTED REPORT: **\*\*CORRECTED\*\*** CORRECTED FORMS CAN BE HANDWRITTEN

**CERTIFIED PAYROLL REPORT**

Employer Name & Address Fill out all other areas of the form as usual.		Name of General / Prime Contractor		Project Name & Location		Contracting Public Authority					
<input type="checkbox"/> Check if subcontractor		Week Ending		Payroll # Correcting from xx to xx		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. Other Taxes Withheld	11. Other Deducts	12. NET Paid
Name/Address/SSN	Class	OT ST				H&W Pens Vac App Other					
Name/Address/SSN	Class	Put the period that is being corrected, i.e.: Oct 26 to Dec 19, not individual weekly dates.									
		ST									
		OT									
		ST									
		OT									
		ST									
		OT									
		ST									
		OT									
		ST									
		OT									
		ST									

The net paid will be the total of difference paid and the total hours being corrected. Provide Check # in margin.

Difference in fringes & corrected fringes if applicable.

Fill In                      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 permissible 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                      Complete                      Signature                      Sign                     

Send cover letter stating what happened, with a signed letter from the employee acknowledging that they were underpaid, received payment, check or transaction number.

**FINAL AFFIDAVIT OF COMPLIANCE  
PREVAILING WAGES**

I, \_\_\_\_\_, \_\_\_\_\_ do hereby certify  
(Name of person signing affidavit) (Title)

that the wages paid to all employees of: \_\_\_\_\_  
(Company name)

for all hours worked on project: \_\_\_\_\_  
(Project name)

\_\_\_\_\_ (Project location)

During the period from \_\_\_\_\_ to \_\_\_\_\_ are in compliance with  
(Project Dates)

Prevailing Wage requirements of Chapter 4115 of the Ohio Revised Code. I further certify that no rebates or deductions have been or will be made, directly or indirectly, from any wages paid in connection with this project, other than those provided by law.

\_\_\_\_\_  
(Signature of Officer or Agent)

\_\_\_\_\_  
(Print Name 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. This affidavit must be submitted to the owner (public authority) before the surety is released or final payment due under the terms of the contract is made.**

## Prevailing Wage Determination Cover Letter

**County:** STARK ✓  
**Determination Date:** 10/25/2023  
**Expiration Date:** 01/25/2024

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 (*)		
<b>Classification</b>											
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, Sheffield, 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 # : LCN02-2023ibLoc84**

**Craft : Asbestos Worker Effective Date : 10/04/2023 Last Posted : 10/04/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
<b>Classification</b>												
Asbestos Insulation Worker	\$35.52		\$8.15	\$9.65	\$0.36	\$0.00	\$6.59	\$0.24	\$0.00	\$0.00	\$60.51	\$78.27
<b>Apprentice</b>	<b>Percent</b>											
1st Year	50.00	\$17.76	\$8.15	\$9.65	\$0.36	\$0.00	\$6.59	\$0.24	\$0.00	\$0.00	\$42.75	\$51.63
2nd Year	60.00	\$21.31	\$8.15	\$9.65	\$0.36	\$0.00	\$6.59	\$0.24	\$0.00	\$0.00	\$46.30	\$56.96
3rd Year	70.00	\$24.86	\$8.15	\$9.65	\$0.36	\$0.00	\$6.59	\$0.24	\$0.00	\$0.00	\$49.85	\$62.29
4th Year	80.00	\$28.42	\$8.15	\$9.65	\$0.36	\$0.00	\$6.59	\$0.24	\$0.00	\$0.00	\$53.41	\$67.61

**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, 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.**

**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: Asbestos Local 3 Heat & Frost Insulators

**Change # : LCN01-2023ibLoc3**

**Craft : Asbestos Worker Effective Date : 10/04/2023 Last Posted : 10/04/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Asbestos Insulation Worker	\$41.58		\$15.30	\$10.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$67.38	\$88.17
Fire Stop Specialist	\$41.58		\$15.30	\$10.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$67.38	\$88.17
Fire Stop Technician	\$34.35		\$15.30	\$4.25	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$53.90	\$71.07
Apprentice	Percent											
1st year	49.32	\$20.51	\$15.30	\$1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$36.81	\$47.06
2nd year	63.12	\$26.25	\$15.30	\$2.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.55	\$56.67
3rd year	68.82	\$28.62	\$15.30	\$3.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.92	\$61.22
4th year	82.60	\$34.35	\$15.30	\$4.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$53.65	\$70.82

**Special Calculation Note :** There are no special calculations for this classification.

**Ratio :**

3 Journeymen to 1 Apprentice per shop

**Jurisdiction ( \* denotes special jurisdictional note ) :**

ASHLAND, ASHTABULA\*, CARROLL, COLUMBIANA, COSHOCTON, CUYAHOGA, ERIE\*, GEAUGA, HARRISON, HOLMES, HURON, LAKE, LORAIN, MAHONING, MEDINA, PORTAGE, RICHLAND, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, WAYNE

**Special Jurisdictional Note :** Ashtabula (the townships of Ashtabula, Austinburg, Geneva, Jefferson, Plymouth & Saybrook), The remainder of Ashtabula County will be considered open counties on a 90 day basis automatically renewable unless revoked by the Union upon 15 day written notice by the employers. Erie (to Sandusky limits)

**Details :**

Mechanics & apprentices engaged in the manufacture, fabrication, assembling, molding, handling, erection, spraying, pouring, mixing, hanging, clean-up, preparation, application, adjusting, alteration, repairing, dismantling, reconditioning, testing & maintenance of Heat & Frost Insulation such as Magnesia, Asbestos, Hair Felt, Wool Felt, Cork, Mineral Wool, Infusorial Earth, Mercerized Silk, Flax, Fiber, Fire Felt, Asbestos Paper, Asbestos Curtain, Asbestos Millboard, Fiberglass, Foam glass, Styrofoam, Polyurethane, fire stopping, smoke stopping, all recyclable material, soundproofing, all

penetrations,any flexible or rigid fireproofing,all jacketing systems including metal,lead,and PVC or other material.



# 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 23 Heavy Hwy (A)

Change # : LCN01-2023ibLoc23HevHwyA

Craft : Bricklayer Effective Date : 06/07/2023 Last Posted : 06/07/2023

	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	\$32.40		\$9.75	\$9.03	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$51.70	\$67.90
Apprentice	Percent											
1st year	70.00	\$22.68	\$9.75	\$9.03	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.98	\$53.32
2nd year	80.00	\$25.92	\$9.75	\$9.03	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.22	\$58.18
3rd year	90.00	\$29.16	\$9.75	\$9.03	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.46	\$63.04

**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: Bricklayer Local 23 Heavy Hwy (B)

Change # : LCN01-2023ibLoc23HevHwyB

Craft : Bricklayer Effective Date : 06/07/2023 Last Posted : 06/07/2023

	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	\$33.39		\$9.75	\$9.03	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$52.70	\$69.39
Apprentice	Percent											
1st year	70.00	\$23.37	\$9.75	\$9.03	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.68	\$54.37
2nd year	80.00	\$26.71	\$9.75	\$9.03	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.02	\$59.38
3rd year	90.00	\$30.05	\$9.75	\$9.03	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.36	\$64.39

**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: Bricklayer Local 23 (Canton)

**Change # : LCN01-2023ibLoc23Canton**

**Craft : Bricklayer Effective Date : 05/10/2023 Last Posted : 05/10/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Bricklayer	\$33.46		\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$54.88	\$71.61
Pointer Caulker Cleaner	\$33.46		\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$54.88	\$71.61
Stone Mason	\$33.46		\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$54.88	\$71.61
Cement Mason	\$33.46		\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$54.88	\$71.61
Plaster	\$33.46		\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$54.88	\$71.61
Masonry Maintenance	\$18.40		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$18.40	\$27.60
<b>Apprentice</b>	<b>Percent</b>											
1st 6 months	65.00	\$21.75	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$43.17	\$54.04
2nd 6 months	70.00	\$23.42	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$44.84	\$56.55
3rd 6 months	75.02	\$25.10	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$46.52	\$59.07
4th 6 months	80.00	\$26.77	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$48.19	\$61.57
5th 6 months	85.00	\$28.44	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$49.86	\$64.08
6th 6 months	90.00	\$30.11	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$51.53	\$66.59
7th 6 months	95.00	\$31.79	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$53.21	\$69.10
8th 6 months	95.00	\$31.79	\$10.24	\$9.88	\$1.25	\$0.00	\$0.00	\$0.05	\$0.00	\$0.00	\$53.21	\$69.10

**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 23 (Youngstown Zone 2 Tile Setters & Finishers)**

**Change # : LCN1-2023ibLoc23YtownZone2TF**

**Craft : Bricklayer Effective Date : 06/01/2023 Last Posted : 05/31/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
<b>Classification</b>												
Bricklayer Tile Setter	\$27.48		\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.91	\$57.65
Marble Mason	\$27.48		\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.91	\$57.65
Terrazzo worker	\$27.48		\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.91	\$57.65
Finisher Support	\$24.89		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.28	\$53.73
Apprentice Finisher Support Only												
1st 30 days	\$14.93		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$14.93	\$22.39
30 days-6 months	\$14.93		\$8.89	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$23.82	\$31.28
2ND 6 months	\$17.42		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33.81	\$42.52
3RD 6 months	\$18.67		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.06	\$44.40
4TH 6 months	\$19.91		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$36.30	\$46.26
5TH 6 months	\$21.16		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.55	\$48.13
6TH 6 months	\$22.40		\$8.89	\$6.90	\$0.60	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$38.79	\$49.99
<b>Apprentice</b>	<b>Percent</b>											
1st 30 Days	60.00	\$16.49	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$16.49	\$24.73
30 days- 6 months	60.00	\$16.49	\$8.89	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$25.38	\$33.62
2nd 6 months	70.00	\$19.24	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.67	\$45.28
3rd 6 months	75.00	\$20.61	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.04	\$47.35
4th 6 months	80.00	\$21.98	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$38.41	\$49.41

5th 6 months	85.00	\$23.36	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.79	\$51.47
6th 6 months	90.00	\$24.73	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.16	\$53.53
7th 6 months	95.00	\$26.11	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.54	\$55.59
8th 6 months	95.00	\$26.11	\$8.89	\$6.90	\$0.64	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.54	\$55.59

**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 Zone NEO 1D

Change # : LCN01-2023ibLocNEZone1D

Craft : Carpenter Effective Date : 08/30/2023 Last Posted : 08/30/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Carpenter	\$31.36		\$8.00	\$11.77	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$53.67	\$69.35
Apprentice	Percent											
1st 3 Months	60.00	\$18.82	\$8.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$26.82	\$36.22
2nd 3 Months	60.00	\$18.82	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$29.36	\$38.76
2nd 6 Months is 1st year	65.00	\$20.38	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$30.92	\$41.12
3rd 6 Months	70.00	\$21.95	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$32.49	\$43.47
4th 6 Months is 2nd year	75.00	\$23.52	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$34.06	\$45.82
5th 6 Months	80.00	\$25.09	\$8.00	\$9.42	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$45.05	\$57.59
6th 6 Months is 3rd year	85.00	\$26.66	\$8.00	\$10.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$47.20	\$60.52
7th 6 Months	90.00	\$28.22	\$8.00	\$10.59	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$49.35	\$63.47
8th 6 Months is 4th year	95.00	\$29.79	\$8.00	\$11.18	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$51.51	\$66.41

**Special Calculation Note :** \*Other is International Training

**Ratio :**

1 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 Floorlayer Zone NEO 1D

**Change # : LCN01-2023ibLocNEZone1D**

**Craft : Carpenter Effective Date : 08/30/2023 Last Posted : 08/30/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Carpenter Floorlayer	\$31.36		\$8.00	\$11.77	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$53.69	\$69.37
Apprentice	Percent											
1st 3 Months	60.00	\$18.82	\$8.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$26.82	\$36.22
2nd 3 Months	60.00	\$18.82	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$29.38	\$38.78
2nd 6 Months is 1st year	65.00	\$20.38	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$30.94	\$41.14
3rd 6 Months	70.00	\$21.95	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$32.51	\$43.49
4th 6 Months is 2nd year	75.00	\$23.52	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$34.08	\$45.84
5th 6 Months	80.00	\$25.09	\$8.00	\$9.42	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$45.07	\$57.61
6th 6 Months is 3rd year	85.00	\$26.66	\$8.00	\$10.00	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$47.22	\$60.54
7th 6 Months	90.00	\$28.22	\$8.00	\$10.59	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$49.37	\$63.49
8th 6 Months is 4th year	95.00	\$29.79	\$8.00	\$11.18	\$0.60	\$0.00	\$1.81	\$0.15	\$0.00	\$0.00	\$51.53	\$66.43

**Special Calculation Note : \*Other is International Training**

**Ratio :**

1 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 Insulation Zone NEO 1D

**Change # : LCN01-2023ibLocNEZone1D**

**Craft : Carpenter Effective Date : 09/13/2023 Last Posted : 09/13/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Carpenter Insulation	\$25.09		\$8.00	\$11.77	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$47.40	\$59.95
Apprentice	Percent											
1st 3 months	60.00	\$15.05	\$8.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$23.05	\$30.58
2nd 3 months	60.00	\$15.05	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$25.59	\$33.12
2nd 6 months	65.00	\$16.31	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$26.85	\$35.00
3rd 6 months	70.00	\$17.56	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$28.10	\$36.88
4th 6 months	75.00	\$18.82	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$29.36	\$38.77
5th 6 months	80.00	\$20.07	\$8.00	\$9.42	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$40.03	\$50.07
6th 6 months	85.00	\$21.33	\$8.00	\$10.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$41.87	\$52.53
7th 6 months	90.00	\$22.58	\$8.00	\$10.59	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$43.71	\$55.00
8th 6 months	95.00	\$23.84	\$8.00	\$11.18	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$45.56	\$57.47

**Special Calculation Note : \*Other is Training**

**Ratio :**

1 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 Millwright NE Zone M1-C

**Change # : LCN01-2023ibLocNEZoneM1-C**

**Craft : Carpenter Effective Date : 08/30/2023 Last Posted : 08/30/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Carpenter Millwright	\$36.70		\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$59.94	\$78.29
Certified Welder	\$37.70		\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$60.94	\$79.79
Lay-Out Man on Monorail	\$39.45		\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$62.69	\$82.42
Apprentice	Percent											
1st 6 months	60.00	\$22.02	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$45.26	\$56.27
2nd 6 months	65.00	\$23.86	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$47.10	\$59.02
3rd 6 months	70.00	\$25.69	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$48.93	\$61.78
4th 6 months	75.00	\$27.53	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$50.77	\$64.53
5th 6 months	80.00	\$29.36	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$52.60	\$67.28
6th 6 months	85.00	\$31.19	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$54.44	\$70.03
7th 6 months	90.00	\$33.03	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$56.27	\$72.78
8th 6 months	95.00	\$34.87	\$8.15	\$11.50	\$0.60	\$0.00	\$2.81	\$0.18	\$0.00	\$0.00	\$58.11	\$75.54

**Special Calculation Note : Other is Training**

**Ratio :**

1 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 (*)		
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	\$18.02	\$23.93
2nd Year	80.20	\$15.80	\$5.05	\$1.00	\$0.15	\$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 Pile Driver Hev Hwy Zone NHH P3-C**

**Change # : LCN01-2023ibLocNEZoneP3-C**

**Craft : Carpenter Effective Date : 08/30/2023 Last Posted : 08/30/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
<b>Classification</b>												
Carpenter Pile Driver	\$30.86		\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$54.08	\$69.51
Diver	\$46.29		\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$69.51	\$92.65
Certified Welder	\$31.91		\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$55.13	\$71.09
<b>Apprentice Percent</b>												
1st 6 months	60.00	\$18.52	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$41.74	\$50.99
2nd 6 months	65.00	\$20.06	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$43.28	\$53.31
3rd 6 months	70.00	\$21.60	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$44.82	\$55.62
4th 6 months	75.00	\$23.14	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$46.37	\$57.94
5th 6 months	80.00	\$24.69	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$47.91	\$60.25
6th 6 months	85.00	\$26.23	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$49.45	\$62.57
7th 6 months	90.00	\$27.77	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$50.99	\$64.88
8th 6 months	95.00	\$29.32	\$8.24	\$11.50	\$0.60	\$0.00	\$2.70	\$0.18	\$0.00	\$0.00	\$52.54	\$67.20

**Special Calculation Note : \*Other is Training**

**Ratio :**

1 Journeymen to 1 Apprentice

**Jurisdiction ( \* denotes special jurisdictional note ) :**

CARROLL, STARK, TUSCARAWAS, WAYNE

**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 pile 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 jettied, 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 Hev Hwy Zone NHH C2-A

Change # : LCN01-2023ibLocNEZoneNHH-C2-A

Craft : Carpenter Effective Date : 08/30/2023 Last Posted : 08/30/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Carpenter	\$31.30		\$8.00	\$11.77	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$53.61	\$69.26
Apprentice	Percent											
1st 3 Months	60.00	\$18.78	\$8.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$26.78	\$36.17
2nd 3 Months	60.00	\$18.78	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$29.32	\$38.71
2nd 6 Months	65.00	\$20.35	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$30.89	\$41.06
3rd 6 Months	70.00	\$21.91	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$32.45	\$43.41
4th 6 Months	75.00	\$23.48	\$8.00	\$0.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$34.02	\$45.75
5th 6 Months	80.00	\$25.04	\$8.00	\$9.42	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$45.00	\$57.52
6th 6 Months	85.00	\$26.60	\$8.00	\$10.00	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$47.15	\$60.45
7th 6 Months	90.00	\$28.17	\$8.00	\$10.59	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$49.30	\$63.39
8th 6 Months	95.00	\$29.73	\$8.00	\$11.18	\$0.60	\$0.00	\$1.81	\$0.13	\$0.00	\$0.00	\$51.46	\$66.32

**Special Calculation Note :** Other: Training

**Ratio :**

1 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 # : LCN01-2022sksHvyHwy

Craft : Bricklayer Effective Date : 06/08/2022 Last Posted : 06/08/2022

	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	\$31.40		\$9.75	\$8.30	\$0.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.95	\$65.65
Apprentice	Percent											
1st year	70.00	\$21.98	\$9.75	\$8.30	\$0.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$40.53	\$51.52
2nd year	80.00	\$25.12	\$9.75	\$8.30	\$0.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.67	\$56.23
3rd year	90.00	\$28.26	\$9.75	\$8.30	\$0.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.81	\$60.94

**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 # : LCN01-2022sksHvyHwy

Craft : Bricklayer Effective Date : 06/08/2022 Last Posted : 06/08/2022

	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	\$32.39		\$9.75	\$8.30	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.95	\$67.15
Apprentice	Percent											
1st year	70.00	\$22.67	\$9.75	\$8.30	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.23	\$52.57
2nd year	80.00	\$25.91	\$9.75	\$8.30	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.47	\$57.43
3rd year	90.00	\$29.15	\$9.75	\$8.30	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.71	\$62.29

**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

Change # : LCN01-2023ibCementHevHwy

Craft : Cement Mason Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	\$33.74		\$8.50	\$7.55	\$0.65	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$52.76	\$69.63
Apprentice	Percent											
1st Year	70.00	\$23.62	\$8.50	\$7.55	\$0.65	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$42.64	\$54.45
2nd Year	80.00	\$26.99	\$8.50	\$7.55	\$0.65	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$46.01	\$59.51
3rd Year	90.00	\$30.37	\$8.50	\$7.55	\$0.65	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$49.39	\$64.57

**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 ) :**

ADAMS, ALLEN, ASHLAND, ASHTABULA\*,  
ATHENS, AUGLAIZE, BELMONT, BROWN,  
BUTLER, CARROLL, CHAMPAIGN, CLARK,  
CLERMONT, CLINTON, COLUMBIANA,  
COSHOCOTON, 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 :** (A) Highway Construction, Sewer, Waterworks And Utility

Construction, Industrial & Building Site, Heavy  
Construction, Airport Construction Or Railroad Construction Work, Power Plant, Tunnels,  
Amusement Park, Athletic Stadium Site Work, Pollution Control, Sewer Plant, Waste & Water Plant,  
Water Treatment Facilities Construction.

\*For Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work, Pollution Control, Sewer  
Plant, Waste & Water Plant, Water Treatment Facility Construction work in the following Counties:  
Ashtabula, Cuyahoga, Fulton, Geauga, Hancock, Henry, Lake, Lucas, Putnam and Wood Counties,  
those counties will use the Cement Mason Statewide Heavy Highway Exhibit B District 1 Wage  
Rate.

**Details :**

This rate replaces the previous Cement Mason Heavy Highway Statewide Rates (Exhibit A and Exhibit B  
rates), except for Cement Mason Statewide Heavy Highway Exhibit B Dist 1. sks

# Prevailing Wage Rate Skilled Crafts

**Name of Union: Cement Mason & Plasterer Local 109**

**Change # : LCN01-2022sksLoc109**

**Craft : Cement Effective Date : 06/01/2022 Last Posted : 06/01/2022**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	\$31.74		\$9.09	\$7.35	\$0.70	\$0.00	\$4.74	\$0.07	\$0.00	\$0.00	\$53.69	\$69.56
Plasterer	\$30.61		\$8.75	\$7.35	\$0.70	\$0.00	\$4.75	\$0.07	\$0.00	\$0.00	\$52.23	\$67.53
<b>Apprentice Cement Mason</b>	<b>Percent</b>											
1st year	70.00	\$22.22	\$9.09	\$7.35	\$0.70	\$0.00	\$4.74	\$0.07	\$0.00	\$0.00	\$44.17	\$55.28
2nd year	79.98	\$25.39	\$9.09	\$7.35	\$0.70	\$0.00	\$4.74	\$0.07	\$0.00	\$0.00	\$47.34	\$60.03
3rd year	90.00	\$28.57	\$9.09	\$7.35	\$0.70	\$0.00	\$4.74	\$0.07	\$0.00	\$0.00	\$50.52	\$64.80
<b>Plasterer Apprentice</b>												
1st year	67.53	\$21.43	\$8.75	\$7.35	\$0.70	\$0.00	\$4.75	\$0.07	\$0.00	\$0.00	\$43.05	\$53.77
2nd year	77.17	\$24.49	\$8.75	\$7.35	\$0.70	\$0.00	\$4.75	\$0.07	\$0.00	\$0.00	\$46.11	\$58.36
3rd year	86.80	\$27.55	\$8.75	\$7.35	\$0.70	\$0.00	\$4.75	\$0.07	\$0.00	\$0.00	\$49.17	\$62.95

**Special Calculation Note : Other is for International Training.**

**Ratio :**

- 1 Journeymen to 1 Apprentice
- 5 Journeymen to 2 Apprentice
- 10 Journeyman to 3 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 # : LCN01-2023ibLoc540in**

**Craft : Electrical Effective Date : 01/11/2023 Last Posted : 01/11/2023**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
<b>Classification</b>												
Electrician	\$36.28		\$6.60	\$10.50	\$1.12	\$3.63	\$3.99	\$1.20	\$0.00	\$0.00	\$63.32	\$81.46
<b>Apprentice</b>	Percent											
1st 1000 hrs	45.00	\$16.33	\$6.60	\$0.00	\$0.46	\$0.00	\$0.49	\$0.49	\$0.00	\$0.00	\$24.37	\$32.53
2nd 1000 hrs	47.00	\$17.05	\$6.60	\$0.00	\$0.48	\$0.00	\$0.51	\$0.51	\$0.00	\$0.00	\$25.15	\$33.68
3rd 1500 hrs	50.00	\$18.14	\$6.60	\$2.63	\$0.55	\$1.45	\$0.59	\$0.59	\$0.00	\$0.00	\$30.55	\$39.62
4th 1500 hrs	60.00	\$21.77	\$6.60	\$5.25	\$0.66	\$1.74	\$0.71	\$0.71	\$0.00	\$0.00	\$37.44	\$48.32
5th 1500 hrs	70.00	\$25.40	\$6.60	\$7.88	\$0.77	\$2.03	\$0.82	\$0.82	\$0.00	\$0.00	\$44.32	\$57.01
6th 1500 hrs	80.00	\$29.02	\$6.60	\$10.50	\$0.88	\$2.32	\$0.94	\$0.94	\$0.00	\$0.00	\$51.20	\$65.72

**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 Wayne Townships.

**Details :**



# Prevailing Wage Rate Skilled Crafts

**Name of Union: Electrical Local 540 Inside Lt Commercial Northern**

**Change # : LCN01-2023ibLoc540in**

**Craft : Electrical Effective Date : 01/11/2023 Last Posted : 01/11/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Electrician	\$36.28		\$6.60	\$10.50	\$1.12	\$3.63	\$3.99	\$1.20	\$0.00	\$0.00	\$63.32	\$81.46
CE-3 12,001-14,000 Hrs	\$27.59		\$6.51	\$0.00	\$0.82	\$0.00	\$0.83	\$0.83	\$0.00	\$0.10	\$36.68	\$50.47
CE-2 10,001-12,000 Hrs	\$21.68		\$6.51	\$0.00	\$0.82	\$0.00	\$0.65	\$0.65	\$0.00	\$0.10	\$30.41	\$41.25
CE-1 8,001-10,000 Hrs	\$19.71		\$6.51	\$0.00	\$0.82	\$0.00	\$0.59	\$0.59	\$0.00	\$0.10	\$28.32	\$38.18
CW-4 6,001-8,000 Hrs	\$17.74		\$6.51	\$0.00	\$0.82	\$0.00	\$0.53	\$0.53	\$0.00	\$0.10	\$26.23	\$35.10
CW-3 4,001-6,000 Hrs	\$15.77		\$6.51	\$0.00	\$0.82	\$0.00	\$0.47	\$0.47	\$0.00	\$0.10	\$24.14	\$32.03
CW-2 2,001-4,000 Hrs	\$14.78		\$6.51	\$0.00	\$0.82	\$0.00	\$0.44	\$0.44	\$0.00	\$0.10	\$23.09	\$30.48
CW-1 0-2,000 Hrs	\$13.80		\$6.51	\$0.00	\$0.82	\$0.00	\$0.41	\$0.41	\$0.00	\$0.10	\$22.05	\$28.95
<b>Apprentice</b>	<b>Percent</b>											
1st 1000 hrs	45.00	\$16.33	\$6.60	\$0.00	\$0.46	\$0.00	\$0.49	\$0.49	\$0.00	\$0.00	\$24.37	\$32.53
2nd 1000 hrs	47.00	\$17.05	\$6.60	\$0.00	\$0.48	\$0.00	\$0.51	\$0.51	\$0.00	\$0.00	\$25.15	\$33.68
3rd 1500 hrs	50.00	\$18.14	\$6.60	\$2.63	\$0.55	\$1.45	\$0.59	\$0.59	\$0.00	\$0.00	\$30.55	\$39.62
4th 1500 hrs	60.00	\$21.77	\$6.60	\$5.25	\$0.66	\$1.74	\$0.71	\$0.71	\$0.00	\$0.00	\$37.44	\$48.32
5th 1500 hrs	70.00	\$25.40	\$6.60	\$7.88	\$0.77	\$2.03	\$0.82	\$0.82	\$0.00	\$0.00	\$44.32	\$57.01
6th 1500 hrs	80.00	\$29.02	\$6.60	\$10.50	\$0.88	\$2.32	\$0.94	\$0.94	\$0.00	\$0.00	\$51.20	\$65.72

**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 # : LCN01-2023ibLoc540VDV

Craft : Voice Data Video Effective Date : 09/06/2023 Last Posted : 09/06/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Electrical Installer Technician	\$25.15		\$6.60	\$4.79	\$0.62	\$2.52	\$2.08	\$0.83	\$0.00	\$0.00	\$42.59	\$55.16
Cable Puller	\$13.80		\$6.51	\$0.00	\$0.31	\$0.00	\$0.41	\$0.41	\$0.00	\$0.00	\$21.44	\$28.34
Apprentice Starting Prior to 08/01/2020												
6th Step 90%	\$22.64		\$6.60	\$4.79	\$0.55	\$1.81	\$2.08	\$0.73	\$0.00	\$0.00	\$39.20	\$50.52
Apprentice Starting After 08/01/2020	Percent											
1st Step	70.02	\$17.61	\$6.60	\$0.00	\$0.43	\$1.41	\$0.57	\$0.57	\$0.00	\$0.00	\$27.19	\$36.00
2nd Step	75.00	\$18.86	\$6.60	\$0.00	\$0.46	\$1.51	\$0.61	\$0.61	\$0.00	\$0.00	\$28.65	\$38.08
3rd Step	80.00	\$20.12	\$6.60	\$4.79	\$0.49	\$1.60	\$0.65	\$0.65	\$0.00	\$0.00	\$34.90	\$44.96
4th Step	85.00	\$21.38	\$6.60	\$4.79	\$0.52	\$1.71	\$0.69	\$0.69	\$0.00	\$0.00	\$36.38	\$47.07

**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 # : LCN01-2023ibLoc7**

**Craft : Lineman Effective Date : 03/01/2023 Last Posted : 03/01/2023**

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$48.59	\$7.00	\$1.46	\$0.49	\$0.00	\$11.66	\$0.75	\$0.00	\$0.00	\$69.95	\$94.24
Certified Lineman Welder	\$48.59	\$7.00	\$1.46	\$0.49	\$0.00	\$11.66	\$0.75	\$0.00	\$0.00	\$69.95	\$94.24
Certified Cable Splicer	\$48.59	\$7.00	\$1.46	\$0.49	\$0.00	\$11.66	\$0.75	\$0.00	\$0.00	\$69.95	\$94.24
Operator A	\$43.54	\$7.00	\$1.31	\$0.44	\$0.00	\$10.45	\$0.75	\$0.00	\$0.00	\$63.49	\$85.26
Operator B	\$38.54	\$7.00	\$1.16	\$0.39	\$0.00	\$9.25	\$0.75	\$0.00	\$0.00	\$57.09	\$76.36
Operator C	\$30.97	\$7.00	\$0.93	\$0.31	\$0.00	\$7.43	\$0.75	\$0.00	\$0.00	\$47.39	\$62.88
Groundman 0-12 months Exp	\$24.30	\$7.00	\$0.73	\$0.24	\$0.00	\$5.83	\$0.75	\$0.00	\$0.00	\$38.85	\$51.00
Groundman 0-12 months Exp w/CDL	\$26.72	\$7.00	\$0.80	\$0.27	\$0.00	\$6.41	\$0.75	\$0.00	\$0.00	\$41.95	\$55.31
Groundman 1 yr or more	\$26.72	\$7.00	\$0.80	\$0.27	\$0.00	\$6.41	\$0.75	\$0.00	\$0.00	\$41.95	\$55.31
Groundman 1 yr or more w/CDL	\$31.58	\$7.00	\$0.95	\$0.32	\$0.00	\$7.58	\$0.75	\$0.00	\$0.00	\$48.18	\$63.97
Equipment Mechanic A	\$38.54	\$7.00	\$1.16	\$0.39	\$0.00	\$9.25	\$0.75	\$0.00	\$0.00	\$57.09	\$76.36
Equipment Mechanic B	\$34.75	\$7.00	\$1.04	\$0.35	\$0.00	\$8.34	\$0.75	\$0.00	\$0.00	\$52.23	\$69.60
Equipment Mechanic C	\$30.97	\$7.00	\$0.93	\$0.31	\$0.00	\$7.43	\$0.75	\$0.00	\$0.00	\$47.39	\$62.88
X-Ray Technician	\$48.59	\$7.00	\$1.46	\$0.49	\$0.00	\$11.66	\$0.75	\$0.00	\$0.00	\$69.95	\$94.24

Apprentice	Percent											
1st 1000 hrs	60.00	\$29.15	\$7.00	\$0.87	\$0.29	\$0.00	\$7.00	\$0.75	\$0.00	\$0.00	\$45.06	\$59.64
2nd 1000 hrs	65.00	\$31.58	\$7.00	\$0.95	\$0.32	\$0.00	\$7.58	\$0.75	\$0.00	\$0.00	\$48.18	\$63.98
3rd 1000 hrs	70.00	\$34.01	\$7.00	\$1.02	\$0.34	\$0.00	\$8.16	\$0.75	\$0.00	\$0.00	\$51.28	\$68.29
4th 1000 hrs	75.00	\$36.44	\$7.00	\$1.09	\$0.36	\$0.00	\$8.75	\$0.75	\$0.00	\$0.00	\$54.39	\$72.61
5th 1000 hrs	80.00	\$38.87	\$7.00	\$1.17	\$0.39	\$0.00	\$9.33	\$0.75	\$0.00	\$0.00	\$57.51	\$76.95
6th 1000 hrs	85.00	\$41.30	\$7.00	\$1.24	\$0.41	\$0.00	\$9.91	\$0.75	\$0.00	\$0.00	\$60.61	\$81.26
7th 1000 hrs	90.00	\$43.73	\$7.00	\$1.31	\$0.44	\$0.00	\$10.50	\$0.75	\$0.00	\$0.00	\$63.73	\$85.60

**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.

\*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 # : LCN01-2023ibLoc7**

**Craft : Lineman Effective Date : 03/01/2023 Last Posted : 03/01/2023**

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$46.03	\$7.00	\$1.38	\$0.46	\$0.00	\$11.05	\$0.75	\$0.00	\$0.00	\$66.67	\$89.68
Substation Technician	\$46.03	\$7.00	\$1.38	\$0.46	\$0.00	\$11.05	\$0.75	\$0.00	\$0.00	\$66.67	\$89.68
Cable Splicer	\$48.21	\$7.00	\$1.45	\$0.48	\$0.00	\$11.57	\$0.75	\$0.00	\$0.00	\$69.46	\$93.56
Operator A	\$41.26	\$7.00	\$1.24	\$0.41	\$0.00	\$9.90	\$0.75	\$0.00	\$0.00	\$60.56	\$81.19
Operator B	\$36.47	\$7.00	\$1.09	\$0.36	\$0.00	\$8.75	\$0.75	\$0.00	\$0.00	\$54.42	\$72.65
Operator C	\$29.28	\$7.00	\$0.88	\$0.29	\$0.00	\$7.03	\$0.75	\$0.00	\$0.00	\$45.23	\$59.87
Groundman 0-12 months Exp	\$23.02	\$7.00	\$0.69	\$0.23	\$0.00	\$5.52	\$0.75	\$0.00	\$0.00	\$37.21	\$48.72
Groundman 0-12 months Exp w/CDL	\$25.32	\$7.00	\$0.76	\$0.25	\$0.00	\$6.08	\$0.75	\$0.00	\$0.00	\$40.16	\$52.82
Groundman 1 yr or more	\$25.32	\$7.00	\$0.76	\$0.25	\$0.00	\$6.08	\$0.75	\$0.00	\$0.00	\$40.16	\$52.82
Groundman 1 yr or more w/CDL	\$29.92	\$7.00	\$0.90	\$0.30	\$0.00	\$7.18	\$0.75	\$0.00	\$0.00	\$46.05	\$61.01
Equipment Mechanic A	\$36.47	\$7.00	\$1.09	\$0.36	\$0.00	\$8.75	\$0.75	\$0.00	\$0.00	\$54.42	\$72.65
Equipment Mechanic B	\$32.88	\$7.00	\$0.99	\$0.33	\$0.00	\$7.89	\$0.75	\$0.00	\$0.00	\$49.84	\$66.28
Equipment Mechanic C	\$29.28	\$7.00	\$0.88	\$0.29	\$0.00	\$7.03	\$0.75	\$0.00	\$0.00	\$45.23	\$59.87
Line Truck w/uuger	\$32.28	\$7.00	\$0.97	\$0.32	\$0.00	\$7.75	\$0.75	\$0.00	\$0.00	\$49.07	\$65.21
<b>Apprentice</b>	<b>Percent</b>										

1st 1000 hrs	60.00	\$27.62	\$7.00	\$0.83	\$0.28	\$0.00	\$6.63	\$0.75	\$0.00	\$0.00	\$43.11	\$56.92
2nd 1000 hrs	65.00	\$29.92	\$7.00	\$0.90	\$0.30	\$0.00	\$7.18	\$0.75	\$0.00	\$0.00	\$46.05	\$61.01
3rd 1000 hrs	70.00	\$32.22	\$7.00	\$0.97	\$0.32	\$0.00	\$7.73	\$0.75	\$0.00	\$0.00	\$48.99	\$65.10
4th 1000 hrs	75.00	\$34.52	\$7.00	\$1.04	\$0.35	\$0.00	\$8.28	\$0.75	\$0.00	\$0.00	\$51.94	\$69.20
5th 1000 hrs	80.00	\$36.82	\$7.00	\$1.10	\$0.37	\$0.00	\$8.84	\$0.75	\$0.00	\$0.00	\$54.88	\$73.30
6th 1000 hrs	85.00	\$39.13	\$7.00	\$1.17	\$0.39	\$0.00	\$9.39	\$0.75	\$0.00	\$0.00	\$57.83	\$77.39
7th 1000 hrs	90.00	\$41.43	\$7.00	\$1.24	\$0.41	\$0.00	\$9.94	\$0.75	\$0.00	\$0.00	\$60.77	\$81.48

**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 # : LCN01-2023ibLoc71CentralOhio

Craft : Lineman Effective Date : 03/01/2023 Last Posted : 03/01/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$43.02	\$7.00	\$1.29	\$0.43	\$0.00	\$8.60	\$0.56	\$0.00	\$0.00	\$60.90	\$82.41
Traffic Signal & Lighting Journeyman	\$41.43	\$7.00	\$1.24	\$0.41	\$0.00	\$8.29	\$0.56	\$0.00	\$0.00	\$58.93	\$79.64
Equipment Operator	\$37.78	\$7.00	\$1.13	\$0.38	\$0.00	\$7.56	\$0.56	\$0.00	\$0.00	\$54.41	\$73.30
Groundman 0-12 months (W/O CDL)	\$22.91	\$7.00	\$0.69	\$0.23	\$0.00	\$4.58	\$0.56	\$0.00	\$0.00	\$35.97	\$47.42
Groundman 0-12 months (W/CDL) plus	\$25.03	\$7.00	\$0.75	\$0.25	\$0.00	\$5.01	\$0.56	\$0.00	\$0.00	\$38.60	\$51.12
Groundsman greater than 1 Year (W/CDL)	\$27.71	\$7.00	\$0.81	\$0.28	\$0.00	\$5.43	\$0.56	\$0.00	\$0.00	\$41.79	\$55.65
Traffic Signal Apprentices											
1st 1,000 hours	\$24.86	\$7.00	\$0.75	\$0.25	\$0.00	\$4.97	\$0.56	\$0.00	\$0.00	\$38.39	\$50.82
2nd 1,000 hours	\$26.93	\$7.00	\$0.81	\$0.27	\$0.00	\$5.39	\$0.56	\$0.00	\$0.00	\$40.96	\$54.43
3rd 1,000 hours	\$29.00	\$7.00	\$0.87	\$0.29	\$0.00	\$5.80	\$0.56	\$0.00	\$0.00	\$43.52	\$58.02
4th 1,000 hours	\$31.07	\$7.00	\$0.93	\$0.31	\$0.00	\$6.21	\$0.56	\$0.00	\$0.00	\$46.08	\$61.62
5th 1,000 hours	\$33.14	\$7.00	\$0.99	\$0.33	\$0.00	\$6.63	\$0.56	\$0.00	\$0.00	\$48.65	\$65.22
6th 1,000 hours	\$37.29	\$7.00	\$1.12	\$0.37	\$0.00	\$7.46	\$0.56	\$0.00	\$0.00	\$53.80	\$72.45
<b>Apprentice Lineman</b>	<b>Percent</b>										

1st 1,000 Hours	60.00	\$25.81	\$7.00	\$0.77	\$0.26	\$0.00	\$5.16	\$0.56	\$0.00	\$0.00	\$39.56	\$52.47
2nd 1,000 Hours	65.00	\$27.96	\$7.00	\$0.84	\$0.28	\$0.00	\$5.59	\$0.56	\$0.00	\$0.00	\$42.23	\$56.21
3rd 1,000 Hours	70.00	\$30.11	\$7.00	\$0.90	\$0.30	\$0.00	\$6.02	\$0.56	\$0.00	\$0.00	\$44.89	\$59.95
4th 1,000 Hours	75.00	\$32.27	\$7.00	\$0.97	\$0.32	\$0.00	\$6.54	\$0.56	\$0.00	\$0.00	\$47.66	\$63.79
5th 1,000 Hours	80.00	\$34.42	\$7.00	\$1.03	\$0.34	\$0.00	\$6.88	\$0.56	\$0.00	\$0.00	\$50.23	\$67.43
6th 1,000 Hours	85.00	\$36.57	\$7.00	\$1.10	\$0.37	\$0.00	\$7.31	\$0.56	\$0.00	\$0.00	\$52.91	\$71.19
7th 1,000 Hours	90.00	\$38.72	\$7.00	\$1.16	\$0.39	\$0.00	\$7.74	\$0.56	\$0.00	\$0.00	\$55.57	\$74.93

**Special Calculation Note :** Other is Safety & Education Fund (\$0.06) and HRA (\$0.50).

**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 than 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

Classification	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
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 W/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.

**Installer/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 # : LCN01-2023ibLoc45

Craft : Elevator Effective Date : 02/01/2023 Last Posted : 02/01/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Elevator Mechanic	\$55.63		\$16.07	\$10.76	\$0.70	\$4.45	\$9.80	\$2.09	\$0.00	\$0.00	\$99.50	\$127.32
Assistant Mechanic	\$44.50		\$16.07	\$10.76	\$0.70	\$3.56	\$9.80	\$1.66	\$0.00	\$0.00	\$87.05	\$109.30
Helper	\$38.94		\$16.07	\$10.76	\$0.70	\$3.12	\$9.80	\$1.47	\$0.00	\$0.00	\$80.86	\$100.33
Apprentice	Percent											
Apprentice												
0-6 months Probation	50.00	\$27.82	\$0.00	\$0.00	\$0.00	\$1.67	\$0.00	\$0.00	\$0.00	\$0.00	\$29.48	\$43.39
1st year	55.00	\$30.60	\$16.07	\$10.76	\$0.70	\$1.84	\$9.80	\$1.15	\$0.00	\$0.00	\$70.92	\$86.21
2nd year	65.00	\$36.16	\$16.07	\$10.76	\$0.70	\$2.17	\$9.80	\$1.36	\$0.00	\$0.00	\$77.02	\$95.10
3rd year	70.00	\$38.94	\$16.07	\$10.76	\$0.70	\$2.34	\$9.80	\$1.47	\$0.00	\$0.00	\$80.08	\$99.55
4th year	80.00	\$44.50	\$16.07	\$10.76	\$0.70	\$2.67	\$9.80	\$1.66	\$0.00	\$0.00	\$86.16	\$108.42

Special Calculation Note : \*Other is Holiday Pay

**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 # : LCN01-2023ibLoc1162**

**Craft : Glazier Effective Date : 05/24/2023 Last Posted : 05/24/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Glazier	\$29.37		\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.04	\$58.73
Apprentice	Percent											
1st 6 months	55.00	\$16.15	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$30.82	\$38.90
2nd 6 months	60.00	\$17.62	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$32.29	\$41.10
3rd 6 months	65.00	\$19.09	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33.76	\$43.31
4th 6 months	70.00	\$20.56	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.23	\$45.51
5th 6 months	75.02	\$22.03	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$36.70	\$47.72
6th 6 months	80.00	\$23.50	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$38.17	\$49.91
7th 6 months	85.00	\$24.96	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.63	\$52.12
8th 6 months	90.00	\$26.43	\$7.50	\$6.79	\$0.38	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.10	\$54.32

**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 # : LCN01-2023ibLoc550**

**Craft : Ironworker Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker	\$33.00		\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$55.68	\$72.18
Apprentice	Percent											
1st 6 months	65.00	\$21.45	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$44.13	\$54.85
2nd 6 months	69.00	\$22.77	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$45.45	\$56.84
3rd 6 months	73.00	\$24.09	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$46.77	\$58.81
4th 6 months	77.00	\$25.41	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$48.09	\$60.79
5th 6 months	81.00	\$26.73	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$49.41	\$62.78
6th 6 months	85.00	\$28.05	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$50.73	\$64.75
7th 6 months	90.00	\$29.70	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$52.38	\$67.23
8th 6 months	95.00	\$31.35	\$9.48	\$9.02	\$0.77	\$0.00	\$3.00	\$0.41	\$0.00	\$0.00	\$54.03	\$69.70

**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
Apprentice	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 HewHwy 2

**Change # : LCN01-2023ibLaborHewHwy2**

**Craft : Laborer Group 1 Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	\$35.05		\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.85	\$66.37
Group 2	\$35.22		\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$49.02	\$66.63
Group 3	\$35.55		\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$49.35	\$67.12
Group 4	\$36.00		\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$49.80	\$67.80
Watch Person	\$27.35		\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$41.15	\$54.83
<b>Apprentice</b>	<b>Percent</b>											
0-1000 hrs	60.00	\$21.03	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$34.83	\$45.34
1001-2000 hrs	70.02	\$24.54	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$38.34	\$50.61
2001-3000 hrs	80.00	\$28.04	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$41.84	\$55.86
3001-4000 hrs	90.00	\$31.54	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$45.35	\$61.12
More Than 4000 hrs	100.00	\$35.05	\$8.20	\$4.05	\$0.45	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$48.85	\$66.37

**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 perform work as per the October 31, 1949, memorandum on concrete forms, by and between the United Brotherhood of Carpenters and Joiners of America 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 members 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), Yarnier, 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, Gunitite 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 # : LCN01-2023ibLoc1015**

**Craft : Laborer Effective Date : 05/03/2023 Last Posted : 05/03/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Laborer Group 1	\$31.52		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.27	\$60.03
Group 2	\$32.52		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$45.27	\$61.53
Group 3	\$33.52		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$46.27	\$63.03
Group 4	\$33.47		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$46.22	\$62.96
Group 5	\$24.56		\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$37.31	\$49.59
<b>Apprentice</b>	<b>Percent</b>											
0-1000 hrs	60.00	\$18.91	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$31.66	\$41.12
1001-2000 hrs	70.00	\$22.06	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$34.81	\$45.85
2001-3000 hrs	80.00	\$25.22	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$37.97	\$50.57
3001-4000 hrs	90.00	\$28.37	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$41.12	\$55.30
More than 4000 hrs	100.00	\$31.52	\$8.20	\$4.05	\$0.40	\$0.00	\$0.00	\$0.00	\$0.10	\$0.00	\$44.27	\$60.03

**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 # : LCN01-2023ibLoc18zone3**

**Craft : Operating Engineer Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Operator Group A	\$41.49		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.74	\$78.48
Operator Group B	\$41.37		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.62	\$78.30
Operator Group C	\$40.33		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$56.58	\$76.74
Operator Group D	\$39.15		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$55.40	\$74.97
Operator Group E	\$33.69		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.94	\$66.78
Master Mechanic	\$41.74		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.99	\$78.86
Cranes & Mobile Concrete Pumps 150'-180'	\$41.99		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.24	\$79.23
Cranes & Mobile Concrete Pumps 180'-249'	\$42.49		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.74	\$79.98
Cranes & Mobile Concrete Pumps 249' and over	\$42.74		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$58.99	\$80.36
<b>Apprentice</b>	<b>Percent</b>											
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59
3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04
<b>Field Mechanic Trainee</b>												
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59

3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04

**Special Calculation Note :** Other: Education & Safety \$0.09; \*Misc is National Training

**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 78, 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, 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); Horizontal 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 # : LCN01-2023ibLoc18hevhwyl

Craft : Operating Engineer Effective Date : 05/01/2023 Last Posted : 04/26/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Operator Class A	\$41.49		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.74	\$78.48
Operator Class B	\$41.37		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.62	\$78.30
Operator Class C	\$40.33		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$56.58	\$76.74
Operator Class D	\$39.15		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$55.40	\$74.97
Operator Class E	\$33.69		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.94	\$66.78
Master Mechanic	\$41.74		\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$57.99	\$78.86
<b>Apprentice</b>	<b>Percent</b>											
1st Year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd Year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59
3rd Year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th Year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04
Field Mech Trainee Class 2												
1st year	50.00	\$20.75	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$37.00	\$47.37
2nd year	60.00	\$24.89	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$41.14	\$53.59
3rd year	70.00	\$29.04	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$45.29	\$59.81
4th year	80.00	\$33.19	\$9.01	\$6.25	\$0.85	\$0.00	\$0.00	\$0.09	\$0.00	\$0.05	\$49.44	\$66.04

**Special Calculation Note :** Other: Education & Safety Fund is \$0.09 per hour. \*Misc is National Training

**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,

**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,

paragraph 65 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, 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 will 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 (*)		
<b>Classification</b>												
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
<b>Apprentice</b>	<b>Percent</b>											
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 plus Years 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/Quality Assurance 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
<b>Apprentice</b>	<b>Percent</b>											
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 mirror 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 Zone 2 Sign

Change # : LCN01-2023ibLoc639

Craft : Painter Effective Date : 03/22/2023 Last Posted : 03/22/2023

	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	\$25.28	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.68	\$0.00	\$0.00	\$27.87	\$40.51
Painter Sign Journeyman Tech/Team Leader Class B	\$25.28	\$1.70	\$0.21	\$0.00	\$0.49	\$0.00	\$0.68	\$0.00	\$0.00	\$28.36	\$41.00
Painter Sign Journeyman Tech/Team Leader Class C	\$25.28	\$1.70	\$0.21	\$0.00	\$0.97	\$0.00	\$0.68	\$0.00	\$0.00	\$28.84	\$41.48
Painter Sign Journeyman Tech/Team Leader Class D	\$25.28	\$1.70	\$0.21	\$0.00	\$1.46	\$0.00	\$0.68	\$0.00	\$0.00	\$29.33	\$41.97
Sign Journeyman Class A	\$25.00	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.67	\$0.00	\$0.00	\$27.58	\$40.08
Sign Journeyman Class B	\$25.00	\$1.70	\$0.21	\$0.00	\$0.48	\$0.00	\$0.67	\$0.00	\$0.00	\$28.06	\$40.56
Sign Journeyman Class C	\$25.00	\$1.70	\$0.21	\$0.00	\$0.96	\$0.00	\$0.67	\$0.00	\$0.00	\$28.54	\$41.04
Sign Journeyman Class D	\$25.00	\$1.70	\$0.21	\$0.00	\$1.44	\$0.00	\$0.67	\$0.00	\$0.00	\$29.02	\$41.52
Tech Sign Fabrication/ Erector Class A	\$19.67	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.53	\$0.00	\$0.00	\$22.11	\$31.95
Tech Sign Fabrication/ Erector Class B	\$19.67	\$1.70	\$0.21	\$0.00	\$0.38	\$0.00	\$0.53	\$0.00	\$0.00	\$22.49	\$32.33

Tech Sign Fabrication/ Erector Class C	\$19.67	\$1.70	\$0.21	\$0.00	\$0.76	\$0.00	\$0.53	\$0.00	\$0.00	\$22.87	\$32.71
Tech Sign Fabrication/ Erector Class D	\$19.67	\$1.70	\$0.21	\$0.00	\$1.13	\$0.00	\$0.53	\$0.00	\$0.00	\$23.24	\$33.08

**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: **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 # : LCN01-2023ibLoc88**

**Craft : Roofer Effective Date : 06/07/2023 Last Posted : 06/07/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Roofer	\$30.07		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$51.45	\$66.49
<b>HELPERS</b>												
Helper -500 Hrs. 1st 6 months	\$16.84		\$2.25	\$0.00	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$21.17	\$29.59
Helper - 500 Hrs. 2nd 6 months	\$18.65		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$40.03	\$49.35
2nd year Helper	\$20.45		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$41.83	\$52.05
3rd year Helper	\$22.26		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$43.64	\$54.77
4th year Helper	\$24.06		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$45.44	\$57.47
5th year Helper	\$25.86		\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$47.24	\$60.17
<b>Apprentice</b>												
	Percent											
1st 6 months w/500 hrs	56.00	\$16.84	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$38.22	\$46.64
2nd 6 months w/500 hrs	62.02	\$18.65	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$40.03	\$49.35
3rd 6 months w/500 hrs	68.00	\$20.45	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$41.83	\$52.05
4th 6 months w/500 hrs	74.02	\$22.26	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$43.64	\$54.77
5th 6 months w/500 hrs	80.00	\$24.06	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$45.44	\$57.46
6th 6 months w/500 hrs	86.00	\$25.86	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$47.24	\$60.17



7th 6 months w/500 hrs	92.02	\$27.67	\$9.50	\$9.80	\$0.40	\$0.00	\$1.50	\$0.18	\$0.00	\$0.00	\$49.05	\$62.89
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**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 # : LCN01-2023ibLoc33Akron

Craft : Sheet Metal Worker Effective Date : 06/01/2023 Last Posted : 05/31/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Sheet Metal Worker	\$34.90	\$9.65	\$13.20	\$0.93	\$0.00	\$7.64	\$0.00	\$0.00	\$0.00	\$66.32	\$83.77
1st year	60.00	\$20.94	\$9.65	\$4.81	\$0.17	\$0.00	\$0.00	\$0.00	\$0.00	\$35.57	\$46.04
2nd year	65.02	\$22.69	\$9.65	\$5.97	\$0.93	\$0.00	\$3.82	\$0.00	\$0.00	\$43.06	\$54.41
3rd year	70.00	\$24.43	\$9.65	\$6.37	\$0.93	\$0.00	\$3.82	\$0.00	\$0.00	\$45.20	\$57.41
4th year	80.00	\$27.92	\$9.65	\$7.18	\$0.93	\$0.00	\$3.82	\$0.00	\$0.00	\$49.50	\$63.46

**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  
 11-13 Journeymen to 5 Apprentice  
 14, 15 Journeymen to 6 Apprentice  
 and maintaining a three to one apprentice ratio thereafter.

**Jurisdiction ( \* denotes special jurisdictional note ) :**

ASHLAND, CARROLL, COSHOCTON,  
 CRAWFORD, HOLMES, MEDINA, PORTAGE,  
 RICHLAND, STARK, SUMMIT, TUSCARAWAS,  
 WAYNE

**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 Industrial Door

Change # : LCN01-2023ibLoc33IndustrialDoor

Craft : Sheet Metal Worker Effective Date : 08/02/2023 Last Posted : 08/02/2023

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Sheet Metal Worker	\$25.42		\$8.66	\$5.55	\$0.17	\$0.00	\$2.15	\$0.00	\$0.00	\$0.00	\$41.95	\$54.66
Trainees	Percent											
1st 60 days Probationary Perios	52.00	\$13.22	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.22	\$19.83
61st day-12 months	58.00	\$14.74	\$8.66	\$1.92	\$0.17	\$0.00	\$1.41	\$0.00	\$0.00	\$0.00	\$26.90	\$34.28
2nd yr	68.00	\$17.29	\$8.66	\$1.92	\$0.17	\$0.00	\$1.59	\$0.00	\$0.00	\$0.00	\$29.63	\$38.27
3rd yr	73.00	\$18.56	\$8.66	\$1.92	\$0.17	\$0.00	\$1.69	\$0.00	\$0.00	\$0.00	\$31.00	\$40.27
4th yr	80.00	\$20.34	\$8.66	\$1.92	\$0.17	\$0.00	\$1.80	\$0.00	\$0.00	\$0.00	\$32.89	\$43.05
5th yr	86.00	\$21.86	\$8.66	\$1.92	\$0.17	\$0.00	\$1.91	\$0.00	\$0.00	\$0.00	\$34.52	\$45.45

Special Calculation Note :

Ratio :

**Jurisdiction ( \* denotes special jurisdictional note ) :**

ASHLAND, ASHTABULA, CARROLL, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DEFIANCE, ERIE, FULTON, GEAUGA, HANCOCK, HENRY, HOLMES, HURON, LAKE, LORAIN, LUCAS, MAHONING, MEDINA, OTTAWA, PAULDING, PORTAGE, PUTNAM, RICHLAND, SANDUSKY, SENECA, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, WAYNE, WILLIAMS, WOOD

Special Jurisdictional Note :

Details :

# Prevailing Wage Rate Skilled Crafts

Name of Union: Sprinkler Fitter Local 669

Change # : LCN01-2022sksLoc669

Craft : Sprinkler Fitter Effective Date : 04/06/2022 Last Posted : 04/06/2022

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sprinkler Fitter	\$43.75		\$10.99	\$7.10	\$0.52	\$0.00	\$5.12	\$0.00	\$0.00	\$0.00	\$67.48	\$89.35
Apprentice Indentured after April 1, 2013	Percent											
CILASS 1	45.00	\$19.69	\$7.85	\$0.00	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$28.06	\$37.90
CLASS 2	50.02	\$21.88	\$7.85	\$0.00	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$30.25	\$41.20
CLASS 3	54.43	\$23.81	\$10.99	\$7.10	\$0.52	\$0.00	\$1.15	\$0.00	\$0.00	\$0.00	\$43.57	\$55.48
CLASS 4	59.43	\$26.00	\$10.99	\$7.10	\$0.52	\$0.00	\$1.15	\$0.00	\$0.00	\$0.00	\$45.76	\$58.76
CLASS 5	64.43	\$28.19	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$48.20	\$62.29
CLASS 6	69.43	\$30.38	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$50.39	\$65.57
CLASS 7	74.43	\$32.56	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$52.57	\$68.85
CLASS 8	79.42	\$34.75	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$54.76	\$72.13
CLASS 9	84.43	\$36.94	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$56.95	\$75.42
CLASS 10	89.44	\$39.13	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$59.14	\$78.70

**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 # : LCN01-2023ibBldgHevHwy**

**Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	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; drivers on tandems; truck sweepers (not to include power sweepers & scrubbers)	\$31.24		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.39	\$64.01
Apprentice	Percent											
First 6 months	80.00	\$24.99	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.14	\$54.64
7-12 months	85.00	\$26.55	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.70	\$56.98
13-18 months	90.00	\$28.12	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.27	\$59.32
19-24 months	95.00	\$29.68	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.83	\$61.67
25-30 months	100.00	\$31.24	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.39	\$64.01

**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 :**



# 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 # : LCN01-2023ibBldgHevHwy**

**Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	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; 5 Axle & Over; Belly Dumps; Low boys - Heavy duty Equipment(irrespective of load carried) when used exclusively for transportation; Truck Mechanics (when needed)	\$31.66		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.81	\$64.64
<b>Apprentice</b>	<b>Percent</b>											
First 6 months	80.00	\$25.33	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.48	\$55.14
7-12 months	85.00	\$26.91	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.06	\$57.52
13-18 months	90.00	\$28.49	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.64	\$59.89
19-24 months	95.00	\$30.08	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.23	\$62.27
25-30 months	100.00	\$31.66	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.81	\$64.64

**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 :**

# Prevailing Wage Rate Skilled Crafts

**Name of Union: Truck Driver Bldg & HevHwy Class 3  
Locals 20,40,92,92b,100,175,284,438,377,637,908,957**

**Change # : LCN01-2023ibBldgHevHwy3**

**Craft : Truck Driver Effective Date : 05/01/2023 Last Posted : 04/26/2023**

	BHR		Fringe Benefit Payments					Irrevocable Fund		Total PWR	Overtime Rate	
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)			MISC (*)
Classification												
Truck Driver CLASS 3 Articulated Dump Trucks; Ridge-Frame Rock Trucks; Distributor Trucks)	\$32.66		\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.81	\$66.14
<b>Apprentice</b>	<b>Percent</b>											
First 6 months	80.00	\$26.13	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.28	\$56.34
7-12 months	85.00	\$27.76	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.91	\$58.79
13-18 months	90.00	\$29.39	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.54	\$61.24
19-24 months	95.00	\$31.03	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.18	\$63.69
25-30 months	100.00	\$32.66	\$7.75	\$9.20	\$0.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.81	\$66.14

**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 :**

## **Appendix C**

## **SCOPE OF BIDS**

### **CITY OF CANTON WATER DEPARTMENT**

#### **NORTHEAST WATER TREATMENT PLANT HIGH SERVICE PUMP #3 AND VFD UPGRADE**

It is understood and agreed that the Contractor has, by careful examination, understands the nature and location of the work; the conformation of the ground; the character, quality, and quantity of the materials to be encountered; the character or equipment and facilities needed preliminary to and during the prosecution of the work; the general and local conditions; local, state, and federal regulations; and all other matters which can, in any way, affect the nature of work specified under this Contract.

All known structures, pipelines, and utilities have been indicated in their approximate locations on the plans, and any material variation in size and location of structures and pipe shall not be cause for extra payment.

Major deviations or modifications during construction, from that shown on, or the true intent of, the plans and specifications requiring more or less labor and materials shall only be authorized by Change Order as approved by the Owner.

The Contractor shall verify the rating and horsepower of the equipment proposed to be furnished and shall provide for any necessary electrical changes to accommodate the equipment furnished at no additional cost to the Owner.

If construction procedures and equipment being utilized by the Contractor prove to be inadequate in the performance of the Contract, the procedures and equipment shall be modified or alternative equipment shall be furnished and used at no additional cost to the Owner.

No separate payment will be made for any item that is not specifically set forth in the Bid, and all costs therefore shall be included in the prices named in the Bid for the various Items of Work. Payment for each respective item shall include such general costs for submittals, samples, tools, coordination, machinery, and appliances necessary to complete the work as specified and in Contract Documents within the timeline specified.

The price Bid shall include, but not limited to, the following:

1. All incidental works specified and or shown on the drawings not included in other bid items. This includes but is not limited to project management, dewatering, construction sequencing, temporary facilitates, pre-construction video, shop drawings, operation and maintenance manuals, documentation, and final close out documents.
2. All tools, equipment, supplies, manufactured articles, labor, operations, and incidentals, supervision, layout and surveying, insurance, overhead [including field overhead (aka General Conditions costs) and home office overhead], applicable taxes, fees, and profit to complete the work as set forth in the Contract Documents.
3. Work also includes all costs of permits and cost of compliance with regulations of public agencies having jurisdiction, including Safety and Health Requirements of the State of Ohio and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).
4. All field staking and surveying necessary for construction shall be established by the Contractor to confirm the locations of all topographic features and underground utilities prior to construction activities.
5. All assistance required by the Owner to verify compliance with the Contract Documents, including measuring of quantities as specified herein.
6. All demolition debris removal, testing required by the Contractor, coordination with testing company hired separately by the Owner for Special Inspections, and other items as required by the Contract Documents.

All BIDDERS must Bid Items specified herein, and award of the Contract will be based on the Bidder's Qualifications as reviewed and approved by the Owner. The work type within this Contract is detailed below and provided for reference. Bidders shall refer to Contract Documents for the full scope and nature of the work to ensure the Bid Price provided for each item is fully inclusive. Contract Drawings shall govern if any discrepancy exists between the Contract Drawings and this document.

1. BID ITEM NO. 1: BONDING
  - a. **Description.** The lump sum bid for this item shall include all bonding.
  - b. **Payment.** Payment for Bonding will be made at the monthly rate of the number of months of the contract (1/# months of contract) of the lump sum price for bonding.
2. BID ITEM NO. 2: MOBILIZATION AND DEMOBILIZATION
  - a. **Description.** The lump sum bid for this item shall include all necessary labor, tools, equipment, materials, and activities including but not limited to mobilizing, demobilizing, construction staging temporary facilities and utilities required during construction, and all other related work and expenses whether specifically mentioned or not, required for the completion of the bid items in accordance with the Contract Documents.
  - b. **Payment.** Payment for mobilization will be made at the rate of 2/3 of the lump sum price bid for this item, to be paid under Contractor's first payment application, with the remaining 1/3 to be paid for demobilization with Contractor's final payment application.
3. BID ITEM NO. 3: HIGH SERVICE PUMP #3 AND VFD UPGRADE, COMPLETE LESS ITEMS 1-2 AND 4-8
  - a. **Description.** The lump sum bid for this item shall include furnishing of all materials, labor, tools, and equipment necessary to perform all work described in the General Conditions, general requirements of Division 01, selective demolition, concrete equipment pads, process piping, dresser coupling, pipe harness, pipe restraints and 24" butterfly valve with new actuator, equipment supports, insulation, painting, electrical, instrumentation and control work, start up, calibration, testing, commissioning, training, operational demonstration, final acceptance and all other related work and expenses whether specifically mentioned or not, required for the completion in accordance with the Contract Documents.
  - b. **Measurement.** The successful Bidder will be required to furnish a breakdown of the lump sum bid as required.
  - c. **Payment.** Payment will be made at the unit price bid for this bid item.
4. BID ITEM NO. 4: LOW VOLTAGE MOTOR CONTROLLER - VARIABLE FREQUENCY DRIVE WITH SOLID STATE BYPASS STARTER (EQUIPMENT ONLY)
  - a. **Description.** This item shall include the cost for the new low voltage motor controller - variable frequency drive with solid state bypass starter for High Service Pump No. 3 delivered F.O.B. jobsite as detailed in Specification 26 29 00. This item shall include all vendor costs for submittals, testing, startup and training. All costs for handling, installation, and contractor coordination shall be included in Bid Item No. 3.
  - b. **Payment.** Payment will be made at the unit price bid for this bid item.
5. BID ITEM NO. 5: TRANSFORMER TR-3A (EQUIPMENT ONLY)
  - a. **Description.** This item shall include the cost for the new 500 KVA 4,160V-480Y/277V oil filled pad mounted transformer delivered F.O.B. jobsite. This item shall include all vendor costs for submittals, testing, startup and training. All costs for handling, installation, and contractor coordination shall be included in Bid Item No. 3.
  - b. **Payment.** Payment will be made at the unit price bid for this bid item.
6. BID ITEM NO. 6: ALLOWANCE 1 - PUMP SERVICE COMPANY
  - a. **Description.** This item shall include a lump sum allowance as specified on the Bid for payment to Ohio Drilling Company to rehabilitate High Service Pumps #3 as detailed in Specification Section 43 21 14.01 including motor removal, new motor, couplings, and baseplate, shop labor, handling and shipment of motor, motor installation, alignment, startup, and testing.

This item includes Ohio Drilling Company scope of supply in Appendix I and the Contractor 5% subcontractor markup. The Contractor's coordination and scope of work shall be included in Bid Item 3.

- b. **Measurement.** All work shall be authorized by the Owner in advance of the work.  
**Payment.** This item must be based on written proposals approved by the Owner. The allowance shall be adjusted by Change Order if the final cost is more than the allowance. Any unspent money shall be deducted from the total contract.

7. BID ITEM NO. 7: ALLOWANCE 2 – SYSTEM INTEGRATOR

a. **Description.** This item shall include a lump sum allowance as specified on the Bid for payment to Dublin Technical Systems Inc. to provide system integration services as detailed in Specification Section 40 95 33 including furnishing the pressure transmitter, instrumentation and controls, PLC programming, database and HMI configuration, startup, testing and training to integrate the new motor, variable frequency drive (VFD) and flow control valve into the existing SCADA system. This item includes Dublin Technical Systems scope of supply in Appendix II and the Contractor 5% subcontractor markup. The Contractor's coordination and scope of work which includes but is not limited to installing the piping gauge and pressure transmitter shall be included in Bid Item 3.

- b. **Measurement.** All work shall be authorized by the Owner in advance of the work.  
**Payment.** This item must be based on written proposals approved by the Owner. The allowance shall be adjusted by Change Order if the final cost is more than the allowance. Any unspent money shall be deducted from the total contract.

8. BID ITEM NO. 8: ALLOWANCE 3 - ADDITIONAL DEMOLITION AND RENOVATION FOR PROCESS, ELECTRICAL, INSTRUMENTATION AND CONTROL

a. **Description.** This item shall include a lump sum allowance as specified on the Bid Form for payment as required due to changes in conditions or revisions based on actual field conditions or alternative equipment furnished by the Contractor.

- b. **Measurement.** All work shall be authorized by the Owner in advance of the work.
- c. **Payment.** This item is over and above what is described in the Contract Documents and must be based on written proposals approved by the Owner. The allowance shall be adjusted by Change Order if the final cost is more than the allowance. Any unspent money shall be deducted from the total contract.

**The City of Canton Water Department  
 Northeast Water Treatment Plant  
 High Service Pump #3 and VFD Upgrade**

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**The City of Canton Water Department  
 Northeast Water Treatment Plant  
 High Service Pump #3 and VFD Upgrade**

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## Supplemental Specification 01-00

### PROJECT DOCUMENTATION AND SUBMITTAL REQUIREMENTS FOR ALL PUBLIC WORK PROJECTS AND SUBDIVISION DEVELOPMENTS

September, 2000

\* Revised May, 2017

**Project Submittals:** The following listed items are the full responsibility of the Contractor. These items become part of the administrative duties imposed upon this Contract. The Contractor shall be responsible for submitting all detail items prior to the contract Notice of Commencement, or as directed by the City's Project Manager. A typewritten letter shall accompany all items, on Company letterhead; clearly describe each item submitted. If Contractor elects to fax any documentation due to expediency, the Contractor will be responsible for submitting hard copy for project documentation. The City will reject any information not clearly legible.

The City will not pay directly for the performance of the work listed. This work is a subsidiary obligation of the Contractor.

1. Preconstruction Video
2. Statements of Final Compliance

1. **Preconstruction Video:** Prior to actual construction, the Contractor shall take video recording of the entire project site.
  - a) The Contractor shall notify the Engineering Department prior to scheduling the video recording of the site. A representative of the Engineering Department shall be present when the recording this video.
  - b) The video and audio recordings shall be on DVD or pre-approved alternative for replay. Contractor must submit alternative medium to the Engineer and approval received prior to scheduling.
  - c) The video portion shall have continuous time and date incorporated into it, locations and person(s) doing the work.
  - d) Audio comments during the recording must address each item in the field of view as it may pertain to the project construction. The recording technician will need to become familiar with the project plans to know what subject matter is pertinent. Further, contractor must incorporate a post recording review and audio comments into the recording.
  - e) Submitted copies of all recordings are the property of the Engineer. Contractor must submit the recording and be accepted in full by the Engineering Department prior to the start of construction.
2. **Statements of Final Compliance:** The Contractor shall submit to the City the following documentation, in addition to the Project's General Conditions. All submittals shall be completed and approved prior to the release of the final retainer.
  - a) Certificates of Substantial and Final Completion. Contractor shall submit in writing, the date on which work is substantially completed and upon Final Completion. Any

deviation from the stated contract completion date to what is being submitted shall be explained further by the Contractor. The City, at their discretion, will further review this subject, as needed.

b) Final Waiver of Lien

Contractor shall furnish a written report indicating the resolution of any and all property damage claims filed with Contractor by any party during the contract period. The information shall include the name of claimant; date filed with Contractor; name of Insurance Company and/or Adjustor handling the claim; how the claim was resolved; if claim was not resolved for the full amount, a statement indicating the reason for such action. If there were no damage claims filed with the Contractor, then this shall be so stated in the report.

**SECTION 01 11 00**  
**SUMMARY OF WORK**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, tools, and equipment necessary, temporary or permanent, to construct the project as specified in the Contract Documents.
  - 1. It is expressly understood and agreed by the Contractor as a part of this Contract that no Owner services, materials, equipment, labor, or property shall be used for this project without the express written permission of the Owner. The Contractor shall reimburse the Owner for any and all such services, materials, equipment, and property used.
  - 2. The Contractor shall make requests to the Owner 48-hours in advance for permission to work outside normal weekday business hours and on Saturdays and Sundays.
  - 3. Contractor shall review and adhere to Owner's standards and regulations for work restrictions, including, but not limited to allowable workdays and hours, noise, dust, daily clean-up.
- B. Project Location:
  - 1. Northeast Water Treatment Plant 2664 Harrisburg Rd. N.E. Canton, Ohio 44705.
- C. Job Conditions
  - 1. Shutdowns. Modifications to the existing Finished Water Piping shall be coordinated with the Owner and shall be completed within a **24-hour duration**. Outages for connections to the power distribution system shall be scheduled with the Owner, and outages shall be limited to a **24-hour duration**.
  - 2. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed. Limit use of the premises to construction activities in areas indicated. Work shall be confined to public rights-of-way and easements. The Contractor shall not obstruct access to buildings, obstruct normal operations, and shall maintain traffic at all times.
  - 3. Always keep driveways and entrances clear and available to the property Owner(s) at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
  - 4. Construction Staging Area. Storage of equipment and materials for construction shall be limited to the staging area defined by the Owner. Construction parking shall be limited to the area defined by the Owner. All areas shall be restored to original condition after work is complete.
    - a. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
    - b. Suitable storage areas for stored materials require coordination and approval by the Owner/Engineer.
  - 5. Burial of waste materials. Waste materials shall not be buried within the project site.
  - 6. The Contractor shall be responsible for site security.
- D. General Summary of Work

1. Work includes the following:
  - a. Installation of a variable frequency drive (VFD) on existing 350 HP High Service #3 with bypass starter on new equipment pad.
  - b. New 4,160V / 480V - 500 KVA stepdown transformer including installation, wiring and startup.
  - c. For High Service Pump (HSP) #3, pump motor replacement from 4,160V to 480V. Contractor shall retain the services and coordinate with a Pump Service Company per Section 43 21 14.01.
  - d. Cutting and removing a section of the existing 24" steel pipe in the Pump Gallery Lower level to install new Owner provided 24" butterfly valve, pipe coupling, and restraint.
  - e. Furnish and install new actuator for Owner provided 24" butterfly valve.
  - f. Repair and replace 2" foam pipe insulation.
  - g. Furnish and install new pressure transmitter on existing 30" Finished Water Header using existing 3/4" pipe tap.
  - h. Furnish and install conduit and wiring and associated supports and appurtenances for new equipment provided under this Contract.
  - i. Integrate new instrumentation and controls for new VFD and modulating flow control valve into the existing plant SCADA system.
  - j. Performance testing per Section 01 79 00.

E. Work by Others

1. Owner will furnish the 24" butterfly valve to be used for the new flow control valve; actuator and adapter plate shall be furnished by the Contractor.

F. Permits

1. Permits shall be handled as described in the Instruction to Bidders.

1.02 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. Contractor is required to be a registered General Contractor with the Owner. Fees for registration are applicable.
- B. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- C. Code and Standards.
  1. Perform all work in compliance with all federal, state, and local codes.
  2. National Sanitation Foundation (NSF) 61. All materials in contact with water shall meet NSF Standard 61, as required by Ohio Administrative Code (AC) Rule 3745-83-01(D).

3. Safety requirements shall be in accordance with the General Conditions and the Occupational Safety and Health Act of 1970, U.S. Department of Labor. The Contractor is required to provide additional provisions for the safety of children in areas of work. These provisions require that the work area shall be fenced; and open excavations, open manholes or similar hazards shall not be left unattended. Excavations shall be secured at night and all equipment and supplies moved to a secured area.
- D. Testing. The Contractor is responsible for the scheduling, coordination, and payment of all additional testing explained in the Contract documents. This includes but is not limited to disinfection testing, leakage testing, pressure testing, startup of equipment, update current arc flash report, etc.
- E. Meet with the Engineer and Owner to determine which systems or facilities must be maintained in use or operation and to determine the acceptable timing of shutdowns.
  1. The Owner has the authority to stop or prohibit work which would interfere with or jeopardize the continuous operation of the system.

#### 1.04 SUBMITTALS

- A. The Contractor shall prepare and provide the following submittals to the Owner and Engineer. No work shall occur until approval is received by the Owner and Engineer.
  1. Construction Staging Area. A site plan of the project site showing the location of storage and activity plan during construction, including parking, tool trailers, field trailers for all construction activity.
  2. Projected Construction Schedule. The Contractor shall prepare a projected construction schedule in the form of a horizontal bar chart. The schedule shall be updated and resubmitted as work progresses. The schedule shall be in accordance with Section 01 32 16, Construction Schedule.
  3. Written Work Plan. Plan shall describe the overall sequence of construction for the Contractor and all subcontractors. The plan shall address equipment lead times, sequence of construction, time frames for when work will be performed, and scheduled shutdowns and outages. This includes various work areas and planned outages or reductions to system capacity. Contractor shall include a description of any work that requires coordination with the Owner.
- B. The Contractor shall field verify existing measurement and conditions prior to submission of Shop Drawing submittals as required in Section 01 33 00, Submittals.

#### 1.05 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### 3.01 GENERAL

- A. Site Verification
  1. The Contractor shall confirm and verify all requirements, conditions, dimensions, and time intervals prior to beginning actual construction in any given area and that the conditions have not changed since preparation, submission, and approval of the sequence of construction. If, in the Contractor's judgment, the proposed work is inconsistent with the Contract Documents, the Contractor shall notify the Owner and Engineer prior to commencing the work.

2. Field Verification. Contractor is responsible for providing labor, equipment, and tools necessary to verify the existing conditions where the proposed work, related to underground utilities, that may cross, connect to, or be in close proximity to the proposed work. If, in the Contractor's judgment, the proposed work is inconsistent with the Contract Documents, the Contractor shall notify the Owner and Engineer prior to commencing the work.

B. Sequences and Interferences

1. Complete as much work as possible before making tie-ins or switchovers.
2. Install and start-up new components prior to removal of the existing components from service, when applicable.
3. Install and maintain temporary parallel components until service is restored.
4. When interferences are unavoidable by the above methods, take the following additional steps:
  - a. Notify the Owner in writing 72 hours in advance of a shutdown so that the Owner can make the necessary preparations.
    - 1) Signed Notice. Each written notice must be signed by the Owner and Engineer/Architect prior to the start of work.
    - 2) Notify all utility companies whose equipment and facilities are directly involved with the proposed work prior to the start of work. Coordinate all work with the utility companies.
    - 3) Notify the Owner when connection has been completed and normal operations can resume.
  - b. Schedule the work so as to minimize the time interval and/or frequency that any critical facility or component is out of service. Shutdowns are limited to 24 hours.
  - c. Coordinate all labor, materials, and equipment to be on the site at the start of a shutdown.
  - d. Work continuously (24 hours per day, 7 days per week) until service is restored.
  - e. Schedule the work to correspond with minimum demands on any system or facilities. This may include weekend or evening work.

3.02 CONSTRUCTION COORDINATION

- A. The Contractor shall coordinate the work of all subcontractors, vendors, crafts, trades, materials, equipment, and all other related items required to complete the Work. The Contractor shall develop and have a final responsibility with respect to coordination of the Work and in developing and enforcing the schedule as specified in Section 01 32 16, Construction Schedule, and herein.
1. The Contractor shall designate an office project manager and a site superintendent. The project manager and site superintendent must have appropriate experience and authority for the work being performed. At any point in the Contract that the designated office project manager or site superintendent needs to be reassigned, resumes must be submitted to the Owner/Engineer for review and approval.
  2. The Contractor will be required to submit to the Engineer the proposed construction sequences for the project. No construction shall commence until review of the Contractor's proposal by the Engineer and Owner.

3. Contractor and subcontractor(s) shall coordinate installation of materials and equipment so as to not interfere with the work of other Contractors or subcontractor(s).
  - a. No extra compensation will be allowed to cover the cost of removing piping, conduit, ducts, etc., or equipment due to a lack of coordination or communication between Contractors and subcontractors.
4. Maintain approved schedules, approved submittals, sequences of construction, copies of communications, and other information as required at the construction site.

### 3.03 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, Delivery, Storage, and Handling, and the manufacturer's instructions.

### 3.04 UTILITIES

- A. Temporary Lighting and Construction Power. The Contractor shall make arrangements with the electric power company to receive temporary lighting and construction power system at the construction site. Such system shall meet all requirements of the NEC, or any other state and local codes for temporary construction services. The permanent power shall be installed prior to start-up, and final acceptance of all improvements. The Contractor shall be responsible to install and remove any temporary power required during construction.
- B. Water. The Contractor shall make its own arrangements to have water at the construction site for any required use.
- C. Sanitary Facilities. Suitable facilities for the use of all persons employed on the construction site shall be provided, maintained, and paid for by each Contractor. The sanitary conveniences shall be properly screened from public observation. The Contractor shall obey and enforce such other sanitary regulations and orders and shall take such precautions against infectious diseases as may be deemed necessary by the Engineer and/or the Owner.
- D. Internet and Cellular Service. The Contractor shall make its own arrangements to have adequate Wi-Fi and cellular service for staff and subcontractors until completion of the Contract.
- E. Fuel. The Contractor shall make its own arrangements to have fuel at the construction site for any required use. All costs for having fuel at the construction site shall be paid by the Contractor.

### 3.05 FINAL CLEAN UP

- A. Refer to Section 01 74 23, Cleaning, for additional requirements.
- B. All debris rubble, unusable materials and items not salvaged shall become the property of the Contractor and shall be removed from the site.
- C. All temporary power, water, bypass pumps, piping, fencing, and bulkheads shall be removed when construction is complete.
- D. All trailers, toolboxes, and equipment shall be removed from the site when construction is complete to allow final grading paving, grading, planting, and seeding to be completed.
- E. Collection, storing, hauling, and disposing of spoil, silt, and waste materials from excavation or any other construction activity as required by Contract Documents and in compliance with all applicable rules and regulations.
- F. The Contractor's construction activities shall be conducted to minimize all unnecessary noise, dust, and odors. The use of oil or other materials which may cause tracking shall not be permitted.



### 3.06 CONTRACTOR'S TEMPORARY CONSTRUCTION FACILITIES

- A. It is the Contractor's responsibility to provide its own field office and/or storage and fabrication enclosures of sufficient size for the project needs. The location of such facilities must be approved by the Owner and the facilities must comply with industry standards and the applicable laws and regulations of the authorities having jurisdiction. These laws and regulations include but are not limited to:
  - 1. Planning/zoning permit.
  - 2. Building code requirements.
  - 3. Health and safety regulations.
  - 4. Utility company regulations.
  - 5. Police, fire department, and rescue squad rules.
  - 6. Environmental protection regulations.
- B. The required certifications and permits must be kept on file for Owner review. The Contractor shall operate the facilities in a safe manner and shall maintain them in a clean and presentable appearance. The General Contractor shall be responsible for coordination of compliance with the requirements of this item.

### 3.07 WALK-THROUGH AND PUNCH LIST

- A. Conduct walk-through of all work areas with Engineer, and compile punch list of repairs and corrections of defects.
- B. Substantial Completion as defined in the Contract. Substantial completion shall be as defined in the Contract. Substantial completion is defined as having High Service Pump #3 operational with VFD control and the 30" control valve operational.
- C. Complete installation and leak/pressure testing of all piping.
- D. Make final terminations to equipment and panels. Calibrate all instrumentation and control systems and panels.
- E. Commence automatic operations of equipment in all areas.
- F. Conduct performance tests of all equipment to demonstrate.
- G. Complete training on all equipment, including electrical system, instrumentation, Local/Remote operation of process I&Cs, and SCADA system operation.
- H. Commence with making final corrections and adjustments included on punch list provide.
- I. Provide all O&M manuals, redline drawings, spare part inventory list, and warranty information.

### 3.08 FINAL ACCEPTANCE

- A. Complete all repairs included on Punch List.
- B. Complete submission of all project closeout documentation.

## **PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

## SECTION 01 31 19.01

### PROJECT MEETINGS AND CONTRACTOR DAILY REPORTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, and equipment necessary to attend and participate in project meetings in accordance with the plans and specifications.
- B. Meetings. This section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Preconstruction conference. On-site meeting facilitated by the Engineer.
  - 2. Progress Meetings facilitated by the Engineer. Monthly progress meetings will be virtual check in meeting via Microsoft Teams (approximately 30 minutes duration). Monthly meetings will be on-site during periods when construction activities are occurring.
- C. Contractor Daily Reports. Contractor Daily Reports shall be uploaded weekly to the Owner provided SharePoint site.

##### 1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

##### 1.03 QUALITY ASSURANCE (NOT USED)

##### 1.04 SUBMITTALS

- A. Contractor's work completed
  - 1. Contractor to provide look-ahead information 24 hours prior to the progress meeting. This shall include activities completed since previous progress meeting in a bullet point list submitted via email.
- B. Contractor's monthly look-ahead
  - 1. Contractor to provide look-ahead information 24 hours prior to the progress meeting. This shall include activities planned work for next month in a bullet point list submitted via email..
- C. Contractor's Daily Reports
  - 1. Contractor to provide Daily Reports, for days when work is being performed, containing the following information at the end of each week:
    - a. Company name, address, phone numbers, date, day of the week, project name, job number, temperature, precipitation, sky conditions, and wind speed. This shall also include the report number, name of the author and signature.
    - b. Activities completed on the job site (including the field labor force at the site by category, company source, and purpose), list of any accidents and safety issues, and critical issues that may impact future work activities.
    - c. Materials delivered that includes time of delivery, material name, quantity, description and purpose.
    - d. Construction equipment on hand, company/source, location on the job site and the purpose.

- D. Provide updated as-built drawings when requested by the Owner or Engineer. Contractor shall maintain a complete set of Contract Drawings onsite to record field measurements, elevations, and other pertinent information related to as-constructed conditions.
  - 1. As built documents shall be reviewed with Owner and Engineer during progress meetings, and submitted during project closeout.

#### 1.05 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### 3.01 PRECONSTRUCTION MEETING

- A. Schedule. The Owner / Engineer will schedule and conduct a preconstruction conference and organizational meeting at the project site or other convenient location after execution of the agreement and prior to commencement of construction activities. No work shall commence prior to the meeting.
- B. Attendees. The Owner, Engineer and their consultants, the Contractors and their superintendents, major subcontractors, manufacturers, suppliers, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda. Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative construction schedule.
  - 2. Critical work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders.
  - 5. Procedures for processing Applications for Payment.
  - 6. Distribution of Contract Documents.
  - 7. Submittal of shop drawings, product data, and samples.
  - 8. Preparation of record documents.
  - 9. Use of the premises.
  - 10. Office, work, and storage areas.
  - 11. Equipment deliveries and priorities.
  - 12. Site safety.
  - 13. Security.
  - 14. Housekeeping.
  - 15. Working hours.
  - 16. Others as appropriate.
- D. Meeting Minutes. The Engineer will distribute minutes to all attendees.

#### 3.02 PROGRESS MEETINGS

- A. Schedule. The Engineer will conduct progress meetings virtually or at the project site.
- B. Attendees. In addition to representatives of the Owner, Engineer and Contractor, each subcontractor, supplier, or other entity concerned with current progress or involved in

planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the project and authorized to conclude matters relating to progress, when required.

- C. Agenda. Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.
  - 1. Contractor's Construction Progress and Look-Ahead.
    - a. Review construction progress since the last meeting.
    - b. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead of or behind schedule.
    - c. Determine how construction behind schedule will be expedited.
    - d. Secure commitments from parties involved to do so.
    - e. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.
    - f. Anticipated work activities and submittal in the upcoming month.
  - 2. Discuss status of RFIs, submittals work orders, change orders, and pay requests.
  - 3. Review special topics for example:
    - a. Interface requirements.
    - b. Completion times.
    - c. Preferred sequences.
    - d. Delivery schedule.
    - e. Off-site fabrication problems.
    - f. Access issues.
    - g. Site utilization.
    - h. Temporary facilities and services.
    - i. Hours of work.
    - j. Hazards and risks.
    - k. Housekeeping.
    - l. Quality and work standards.
- D. Schedule Updating. The Contractor shall revise the construction schedule if required.
- E. Meeting Minutes. The Engineer will prepare and distribute minutes to all attendees.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 32 16**  
**CONSTRUCTION SCHEDULE**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Scope of Work. Perform the work necessary to provide the Critical Path Method (CPM) schedules for all work in accordance with the drawings and specifications. Work shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the public and to the operation and maintenances of existing facilities.
  - 1. The Contractors shall allow for construction and schedule constraints in preparing the construction schedules and include activities necessary to complete work detailed in Contract Documents.
- B. Requirements. This section specifies administrative and procedural requirements for the CPM of scheduling and reporting progress of the work.
  - 1. Refer to General Conditions and the Agreement for definitions and specific dates of Contract Time.
  - 2. Shutdowns. Modifications to the existing Finished Water Piping shall be coordinated with the Owner and shall be completed within a **24-hour duration**. Outages for connections to the power distribution system shall be scheduled with the Owner, and outages shall be limited to a **24-hour duration**.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Consultant. Retain a Consultant to provide CPM scheduling services, including planning, evaluating, and reporting.
  - 1. The Consultant shall be a recognized specialist, expert in the CPM of scheduling and reporting, and acceptable to the Engineer.
  - 2. The Consultant shall have computer facilities available with sufficient capacity to process detailed network diagrams within 48 hours of a request.
- C. In-House Option. The requirement to retain a Consultant may be waived if the Contractor can demonstrate that:
  - 1. The Contractor has the computer equipment required to produce CPM network diagrams.
  - 2. The Contractor employs skilled personnel who are experienced in CPM scheduling and reporting techniques.
- D. Program. Use a computer software program for network analysis that has been developed specifically to manage CPM construction schedules and is acceptable.

- E. Standards. Comply with procedures contained in “The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry,” published by the Associated General Contractors of America.
- F. Definitions
  - 1. Critical Path Method. CPM is a construction scheduling technique using network analysis diagrams to plan and organize construction activities in an orderly manner along the critical path.
  - 2. Network. A network diagram is a graphic representation showing the relationship of activities and events in the correct sequences required to complete the project within the Contract Time.
  - 3. Activity. An activity is any single identifiable step in the project. It depends upon and cannot begin until completion of all preceding activities.
  - 4. Critical activities are activities with no (zero) float time and are, therefore, operations that determine the critical path and control project completion.
  - 5. Event. An event is the starting or ending point of an activity and occurs only when all preceding activities have been completed.
  - 6. Float Time. The amount of time available for a given activity in excess of its estimated duration. It represents the amount of leeway available in scheduling an activity. All float time belongs to the Owner.
    - a. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
    - b. Total float is the amount of time an activity can be delayed without adversely affecting overall time for project completion.

#### 1.04 SUBMITTALS

- A. Preliminary Network Diagram. Within 15 calendar days after the date of the Notice to Proceed, submit a preliminary network diagram outlining activities for the first 90 days of construction. Include a skeleton diagram for the remainder of the work with the preliminary diagram.
  - 1. Include each significant construction activity. Coordinate each activity in the network with other activities. Schedule each construction activity in proper sequence.
  - 2. Indicate completion of the work in advance of the date established for Substantial Completion.
- B. Schedule of Values. With the submittal of the preliminary network diagram, include a schedule of values and a preliminary monthly cash requirement prediction based on all indicated activities.
- C. Tabulation of Submittals. With the submittal of the preliminary network diagram, include a tabulation by expired date of submittals required during the construction. List those required to maintain orderly progress of the work, and those required early because of long lead time for manufacture or fabrication. Contractor shall allow 2 weeks' time for Owner and Engineer first review and 2 weeks' time for Engineer second review.
- D. Distribution. Distribute the preliminary network diagram to all parties that need to know about construction activities that are scheduled during the first 3 months, including the Engineer and Owner.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS (NOT USED)

2.02 CPM SCHEDULE

- A. Prepare a CPM schedule in accordance with Part 3 of this section. The CPM schedule shall include a complete listing of all abbreviations and symbols utilized within the CPM schedule.

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING (NOT USED)

3.02 CPM SCHEDULE

- A. General. Prepare a CPM Construction Schedule using the network analysis diagram system known as the Critical Path Method (CPM).
  - 1. Follow the steps necessary to complete development of the network diagram in sufficient time so that the CPM schedule can be submitted and accepted for use before the first progress payment.
  - 2. Conduct educational workshops to train and inform key project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  - 3. Establish procedures for monitoring and updating the CPM schedule and for reporting progress, coordinate procedures with progress meeting dates. Use "one working day" as the unit of time.
- B. CPM Schedule Preparation. Prepare a listing of all activities involved in the project; include every activity having a bearing on the time required to complete the work. Provide the best data available for generation of the network diagram and CPM schedule.
  - 1. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities.
  - 2. Indicate estimated times for the following activities to be performed:
    - a. Preparation and processing of submittals.
    - b. Temporary construction services and facilities.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Installation.
    - g. Start-ups.
    - h. Operational demonstration.
    - i. Training.
    - j. Progress meetings.
    - k. Preconstruction conference.
- C. Processing. Enter prepared data on the processing system. Process data to produce output data or a computer-drawn time-scaled network based on calendar days. Draw network by



hand if the equipment is unable to do so. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the best possible CPM construction schedule within the limitations of Contract Time.

- D. Format. Display the full network on a single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.
1. Mark the critical path. Locate the critical path near the center of the network; locate paths with the most float near the edges.
  2. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Initial Issue. Prepare the initial issue of the CPM Schedule network diagram from a listing of straight "early-start total-float" sort. Identify critical activities. Prepare tabulated reports to show the following:
1. Contractor or subcontractor and work or activity.
  2. Principal events of that activity.
  3. Early and late start dates.
  4. Early and late finish dates.
  5. Activity duration in working days.
  6. Total float or slack.
  7. Average size of work force.
  8. Dollar value of activity (coordinated with Schedule of Values)
  9. Value Summaries. Prepare two cumulative value listings, sorted by finish dates.
    - a. In first listing, tabulate the following:
      - 1) Activity number.
      - 2) Early finish date.
      - 3) Dollar value.
      - 4) Cumulative dollar value.
    - b. In the second listing, tabulate the following:
      - 1) Activity number.
      - 2) Late finish date.
      - 3) Dollar value.
      - 4) Cumulative value.
    - c. In subsequent issues of both listings, substitute actual finish dates for activities completed as of date of listing.
    - d. Prepare listing for ease of comparison with payment requests, coordinate timing with Progress Meetings.
    - e. In both value summary listings, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    - f. Submit value summary printouts following each regularly scheduled progress meeting.

- F. Submittal and Distribution. Submit the initial issue of the network for acceptance. When authorized, distribute copies to the Engineer (three copies), Owner, principal subcontractors and suppliers or fabricators, and others identified by the Contractor with a need-to-know-schedule responsibility.
1. Post copies in the project meeting rooms and temporary field office.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in performance of construction activities.
  3. Submit copies of each computer-produced report (listing).
- G. Schedule Updating. Revise the schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each project meeting.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 32 33**  
**CONSTRUCTION PHOTOGRAPHS**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment, and incidentals to furnish the construction photographs.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Ensure that materials and workmanship are in accordance with the following standards referenced here.

1.03 QUALITY ASSURANCE

- A. Quality of Photographs. Photographs shall be suitable quality to produce printed copies with sufficient pixel quality to show details of construction.

1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Submittal Packages
  - 1. Photos shall be submitted electronically on an Owner provided SharePoint site.
  - 2. At the completion of the project, submit all photography taken of the project on three (3) separate USB 3.0 Flash Drives of sufficient size to contain the complete electronic submittal.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS (NOT USED)

**PART 3 - EXECUTION**

3.01 EXECUTION

- A. Preconstruction Photos: A minimum of one-hundred (100) preconstruction photos shall be taken of the jobsite prior to construction activities. The photographer shall select the vantage points to show the condition of the areas where the Contractor will be working, storing materials, handling equipment and deliveries, and performing work.
- B. Construction Photos: These photos shall be taken throughout the project to document the work including but limited to demolition, installation and as-built conditions at time of final acceptance. The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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## SECTION 01 33 00

### SUBMITTALS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF WORK

###### A. Scope of Work

1. Provide all labor and materials necessary to furnish the following submittals as required by each individual section of the specifications.
  - a. Shop drawings.
  - b. Product data.
  - c. Samples/mock-ups.
  - d. Operation and Maintenance (O&M) manuals.
  - e. Personnel qualifications.
  - f. Training documents.
  - g. Source quality control documents.
  - h. Material field test reports.
  - i. Start-up documents.
  - j. Operational demonstration documents.
  - k. Product/material certifications.
  - l. Special warranties.
  - m. Project record documents.
  - n. Others (as specified in the individual technical specifications).

##### 1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

##### 1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

##### 1.04 SUBMITTALS

- A. Submit all submittals in accordance with the requirements within this specification section.

###### B. Submittal Package No. 1 – Submittal Schedule

1. Submit a submittal schedule as required herein and include the following:
  - a. This schedule shall include all submittals that are required to complete the project in its entirety and the date of submittal to the Engineer.
  - b. Include in schedule a milestone for notification of the Engineer prior to field-verifying operation and maintenance manuals.

- c. Submittals requiring multiple submissions shall include multiple listings on the documents.
- d. The Engineer will review the list and make any necessary comments.
- e. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
- f. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently.
- g. Processing. Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals, depending upon the complexity of the submittal.
  - 1) Allow 4 weeks for processing each submittal.
  - 2) No extension of the Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the work to permit processing.

#### 1.05 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS (NOT USED)

#### 2.02 SUBMITTAL TRANSMITTAL

- A. Transmit each submittal from the Contractor to Engineer using a Submittal Transmittal form. Include the following on the transmittal form.
  - 1. Project Name
  - 2. Owner's Project Number, if applicable
  - 3. Submittal Number
  - 4. Specification and/or Drawing Reference Number
  - 5. Date of Submittal
  - 6. Submittal Description.
  - 7. Relevant information and requests for data.
  - 8. Deviations from Contract Document requirements, including minor variations and limitations.
  - 9. Other pertinent information to identify the items being submitted.

#### 2.03 GENERAL REQUIREMENTS FOR SUBMITTALS

- A. Originals
  - 1. The Contractor, the subcontractors, or suppliers shall generate submittal information.
  - 2. No reproductions of partial (or complete) versions of the plans, sections, details, schematics, specification pages, etc., from the Contract Documents are acceptable.
- B. Complete Submittals
  - 1. Clearly describe the equipment to be furnished with complete and detailed submittal information.
- C. Identification

1. Properly identify all submittal-related documents and arrange in a logical order to best present the information. Provide an index that includes the following on every submittal.
  - a. Manufacturer's name and address.
  - b. Submittal date and revision number, if applicable.
  - c. Contract identification and specification section.
  - d. Drawing scale and orientation.
  - e. Submittal page number or sequence of pages.
  - f. Drawing number.
- D. Verification
  1. Where existing conditions or structures exist, field-verify dimensions, elevations, clearances, etc.
  2. The submittal shall not be accepted for review until such verified data is clearly indicated.
- E. Legends
  1. All submittal diagrams, drawings, schematics, etc., shall include complete keys, legends or similar explanation as to the graphics, and symbols and abbreviations used.
  2. In general, all graphics, symbols, abbreviations, and equipment nomenclature used for a submittal shall duplicate those used on the Contract Drawings.
- F. Approvals
  1. Provide the following on each submittal.
    - a. A space approximately 4" x 5" on to record the Contractor's review and approval markings and the action taken. These shall include the Contractor's:
      - 1) Approval stamp.
      - 2) Signature.
      - 3) Date of approval.
      - 4) Deviations from the Contract Documents.
  2. An equal area beside the Contractor's review and approval markings for the Engineer's review stamp.
- G. One Section per Submittal. Each submittal shall pertain to only one specification section.
- H. All submittal information shall be:
  1. Neatly arranged.
  2. Legible and not distorted or faded
  3. Include a table of contents and electronic bookmarks for navigation.
  4. English.
  5. In United States standard units.
  6. Typed.



- I. All letters, certifications, and similar documents shall be submitted in their entirety. Single pages of multiple-page letters, or letters with deleted passages will not be acceptable for submittal purposes.
- J. "Generic" letters, test reports, material certifications, or similar documents which do not specifically address the requirements of the Contract Documents for the actual materials being furnished will not be acceptable.
- K. Mark all submittals to clearly indicate the full extent of the equipment to be furnished.
  - 1. Indicate all options to be provided, materials of construction, dimensions, and other information pertinent to the submittal.
  - 2. Options, materials, and dimensions which do not pertain to the materials or equipment to be furnished shall be neatly marked out so as to avoid confusion and doubt during review, delivery, and installation.
- L. Resubmittals must clearly identify all changes and revisions.
  - 1. The drawing shall be marked "revised" with the revision date indicated.
  - 2. Each resubmittal shall reference the previous submittal by the Engineer's log number.
- M. Definitions of "By Others"
  - 1. All submittals are reviewed as if prepared by the General Contractor.
  - 2. The term "By Others" is appropriate to indicate supply by the Owner.
  - 3. Where a subcontractor or supplier uses the term "By Others" to indicate work by the General Contractor or another subcontractor or supplier, the General Contractor shall change "By Others" to indicate the actual source.
- N. Deviations from Contract. Highlight, encircle, or otherwise indicate deviations from the Contract Documents in all submittals.

#### 2.04 SPECIFIC SUBMITTAL – TYPE REQUIREMENTS

- A. Shop Drawings. The following paragraphs detail the general requirements for shop drawings and specific requirements for specific types of shop drawings.
  - 1. General Requirements
    - a. A shop drawing is a detailed representation of the work to be performed to demonstrate compliance with the Contract Drawings including:
      - 1) Material and equipment layout.
      - 2) Fabrication drawings.
      - 3) System and electrical schematic diagrams.
      - 4) Equipment and material schedules.
      - 5) Installation details.
    - b. Submit newly prepared information, drawn to accurate scale.
    - c. Standard information prepared without specific reference to the project is not considered shop drawings.
  - 2. Equipment/Material Layout Drawings
    - a. Include
      - 1) Plot plans.

- 2) Plant site maps.
  - 3) Equipment location plans.
  - 4) Equipment and material layout plans and sectional views.
  - 5) Connection detail drawings.
  - 6) Similar drawings showing the incorporation of materials and equipment into the work.
  - 7) The physical layout to scale, including elevations, plant grid coordinates, dimensions to new/existing structures, and other items of the work.
  - 8) Dimensions.
  - 9) Labeling.
  - 10) Notes.
  - 11) Legends.
  - 12) Bills of materials.
  - 13) All other information required to graphically describe the proposed work.
3. System Schematics and Diagrams
- a. These include schematic representations of systems and equipment in a manner which shows the relative relationship of the components within the system and interconnections or interfaces with other systems or equipment.
  - b. These systems shall be shown on the most appropriate type and format of schematic diagram.
  - c. Diagrams shall identify all equipment and other components.
  - d. Indications shall be provided of system features such as flow directions, flow ranges, component sizes, capacities, settings, interlocks, component identification, and component or subsystem function.
  - e. Various types of systems for which schematic diagrams shall be required include, but not limited to, are the following:
    - 1) Process Piping Systems.
    - 2) Plumbing and Utility Piping Systems.
    - 3) Heating and Air Conditioning Systems.
    - 4) Ventilating Systems.
    - 5) Pneumatic Systems.
    - 6) Hydraulic Systems.
    - 7) Conveying Systems.
    - 8) Process and Chemical Feed Equipment Systems.
    - 9) Electrical Distribution Systems.
    - 10) Control Systems.
    - 11) Alarm Systems.
    - 12) Communication Systems.

- f. In some instances, it may be appropriate to combine multiple types of system schematics onto a single drawing. In general, this practice would be appropriate for simple, self-contained systems and the adjacent subsystems and when required to clearly show system functionality.

B. Product Data

- 1. Product data is submittal information that fully describes the item to be incorporated into the work. Product data shall include, but not limited to, the following when applicable:
  - a. Manufacturer name.
  - b. Catalog cut-sheets.
  - c. General descriptive bulletins/brochures/specifications.
  - d. Materials of construction data and parts list.
  - e. Finish/treatment data.
  - f. Equipment/material weight/loading data.
  - g. Power/utility requirements.
  - h. Engineering design data, calculations, and system analyses.
  - i. Digital system documentation.
  - j. Any deviations from the contract documents.
  - k. Material Certifications. These include signed certificates or declarations by the Contractor, supplier, manufacturer, testing laboratory, or recognized certification agency which document that materials and product composition, or construction comply with specified requirements and stated reference standards.
  - l. Manufacturer's printed recommendations.
  - m. Compliance with recognized trade association and testing agency standards.
  - n. Application of testing agency labels and seals.
  - o. Notation of dimensions verified by field measurement.
  - p. Notation of coordination requirements.
  - q. Specific response to detailed specification requirements.
  - r. Maximum operating pressure and temperature ratings.
  - s. Other information specifically called for under the sections of Divisions 1 through 44 shall be included in this category.

C. Samples or Mock-Ups

- 1. Samples
  - a. Samples are portions of, or complete units of the precise article proposed to be furnished.
- 2. Color and Pattern Charts
  - a. When the precise color and pattern are not specifically prescribed in the Contract Documents, or when the Contract Documents require that a product be furnished in a color or pattern directed by the Owner or Owner's Representative, submit

accurate color charts and pattern charts of the available ranges for review and selection.

3. Mock-Ups

- a. Build mock-ups with full-size products to match the scale of the proposed construction to demonstrate compliance with specified requirements and construction standards.

D. O&M Manuals

1. General

- a. A complete Electronic Submittal shall be provided and shall be bookmarked by section.
- b. Bind each copy in an appropriately sized three ring notebooks with a cover designating the name of equipment, maintenance, and specification number.
- c. Bind operation and maintenance instructions for each specification in a separate notebook.

2. Required Information

- a. Include the following information to provide a description of the incorporation of the equipment into the work and with functional data to evaluate equipment operation.

1) Operation Sequence Descriptions

- a) Include complete, detailed written descriptions of the operating sequence of all control systems and operations in all modes.
- b) Be specifically prepared for this work.
- c) Be fully referenced to control diagrams and system components.
- d) Include start-up and shut-down procedures and operations under manual, automatic, and emergency (alarm) conditions and any alternate operating modes.
- e) Include operation of switches, lights, timers, relays, contacts, valves, motors, and equipment components.
- f) Describe interlock functions including system safety functions.

b. Software/Programming Documentation

- 1) Reference this documentation to the Operating Sequence Descriptions and include flow charts, program source codes listings, and documentation ladder diagrams with detailed descriptions for each rung of the software provided.
- 2) Provide information to instruct and to familiarize the operator with the system programming to enable a step-by-step evaluation of the program.
- 3) Provide notations, remarks, and labeling on the program source code listing to indicate the program operation and function.
- 4) Provide any additional narrative description of the program operation to fully describe the system parameters and functionality in a clear and logical manner.

c. Manufacturer's Instructions

- 1) Installation, routine preventive maintenance, troubleshooting, and lubrication instructions.
    - a) Manufacturer recommended schedules (ex., monthly, quarterly, semi-annual, annual, bi-annual, every 3 to 5 years) for listed procedures/tasks
    - b) An estimate (in ½ hour increments) of labor-hours to perform scheduled maintenance tasks
    - c) An estimate of material costs to perform scheduled maintenance tasks
  - 2) Manufacturer recommended maintenance procedures/tasks while in storage/during construction
  - 3) Procedures for moving, supporting, and anchoring of equipment, including tolerances for settings and adjustment.
  - 4) Manufacturer recommended maintenance procedures/tasks when in operation
  - 5) Material Information/Spare Parts for critical equipment needed to perform maintenance tasks including but not limited to filters, belts and lubricants. Spare parts information should also be provided for equipment parts/components known to have a high failure history. Parts information should include list prices, OEM part numbers, and installer and local supplier/ manufacturer contact information.
- d. Parts List
- 1) Include assembly, exploded-view illustrations, or sectional drawings with all parts identified. Also include descriptions, quantity (per assembly) required, and original equipment manufacturer's part numbers.
- e. Supplier Data
- 1) Provide addresses, telephone numbers, and names of contact persons for equipment manufacturer and manufacturer's representative. Include both regional (local) and home offices.
- f. Warranties and Guarantees
- 1) Include copies of the approved draft warranties in the initial operation and maintenance manual submittal. Following substantial completion, provide copies of the executed final warranties for insertion into the final operation and maintenance manuals.
- g. Approved Submittals
- 1) Provide a complete list (including submittal numbers) of all “Approved” or “Approved as Noted” submittals pertaining to the operation and maintenance instructions.
- h. Copies of all materials shipped with the equipment.
- i. Copies of all approved submittals including control wiring diagrams.
- E. Personnel Qualifications
1. General
    - a. These qualification statements and information pertain to personnel and entities employed in the prosecution of the work.

2. Specific Information
  - a. Provide the following information regarding the proposed personnel or entity.
    - 1) Education/training.
    - 2) Company employment history.
    - 3) Professional experience.
    - 4) References.
    - 5) Certifications or licenses.
  3. Stated qualifications shall be pertinent to the specific task for which qualifications are requested.

F. Training Documents

1. Instructors' Qualifications. See requirements provided herein.
2. Proposed schedule for the training sessions.
3. Lesson Plan. Lesson plans shall:
  - a. Be O&M Manual-based.
  - b. Cover all components of each system regardless of source of supply or manufacturer.
  - c. Detail the instructional objective statement on the goal(s) intended to be achieved by the end of the training session.
  - d. Indicate the category of training (operation, maintenance, and electrical instrumentation); describe the session including length and type (classroom or field) and the instructor.
4. One copy of all instructional material to be used during training.
5. A sign-in sheet containing the signature of each attendee, training topic, and date after the training is completed.

G. Source Quality Control Documents

1. Inspection
  - a. Inspection data includes inspection procedures and results of factory inspections of products, equipment, or systems.
  - b. Within this type of submittal information are factory witness test procedures, schedules and reports, and similar data.
2. Testing
  - a. Test data is the information leading to or resulting from tests performed on materials, equipment, or systems at the manufacturer's facilities or in testing laboratories.
  - b. This also includes data on testing equipment.
  - c. Examples of test data include all information, test arrangement, drawings, illustrations, diagrams, curve plots, graphs, and other data which substantiates or establishes a material or product characteristic, quality, or other trait as a result of test required by the Contract Documents.

H. Material Field Test Reports

1. Report Data
  - a. Written reports of each inspection, test, or similar service shall include, but not be limited to:
    - 1) Date of issue.
    - 2) Project title and number.
    - 3) Name, address, and telephone number of testing agency.
    - 4) Dates and locations of samples and tests or inspections.
    - 5) Names of individuals making the inspection or test.
    - 6) Designation of the work and test method.
    - 7) Identification of product and specification section.
    - 8) Complete inspection or test data.
    - 9) Test results and interpretations of test results.
    - 10) Ambient conditions at the time of sample taking and testing.
    - 11) Comments or professional opinion as to whether inspected or tested work complies with Contract Document requirements.
    - 12) Name and signature of laboratory inspector.
    - 13) Recommendations on testing.
  2. Example reports covered by this paragraph include compaction tests and concrete, leakage, and disinfection tests.
- I. Start-Up Documents
  1. Start-Up Request
    - a. Start-up requests shall include the following:
      - 1) Qualifications of Manufacturer's Representative. See requirements provided herein.
      - 2) Field Test Procedures.
        - a) List of materials and equipment necessary for testing.
        - b) Calibration. Certification of calibration of all test instruments used.
        - c) Test Form Report. Copy of testing results report form.
      - 3) Proposed start-up schedule including all field testing.
    2. Manufacturer's Representative's Reports
      - a. Each manufacturer's representative shall prepare a report on every site visit for each system or item of equipment inspected, adjusted, started up, or worked on.
      - b. If a manufacturer's representative visits the site for equipment specified in several specification sections, a separate report shall be filed for each specification section.
      - c. The report shall state:
        - 1) The purpose of the visit.
        - 2) The representative's observations and conclusions.

- 3) Recommendations for further visits or action.
- 4) A tabulation or log of the settings of all adjustable components.
  - a) Initial settings shall be recorded and submitted on the first visit.
  - b) During subsequent visits, the manufacturer's representative shall add the current or adjusted setting to the tabulation or log.
- 5) Include manufacturer's certification that equipment being tested has been inspected with regard to conformance to the plans, specifications, and shop drawings and that it has been tested and is ready for operational demonstration.
- 6) All test reports for all required field testing.

J. Operational Demonstration Documents

1. Operational Demonstration Request
  - a. Name, address, and telephone number of all representatives during the operational demonstration.
  - b. Sample operational demonstration log for Engineer review.
2. Operational Demonstration Log
  - a. An operational demonstration log is a continuous chronological record of operational status of the system and equipment.
  - b. Include all changes in status or system parameters, adjustments, and results of tests.
  - c. Make entries, noting the date and time, at the occurrence of each event.
  - d. Use acceptable operational demonstration log forms.

K. Special Warranties

1. There are two general types of warranties covered by this specification.
  - a. Manufacturer's Express Warranties
    - 1) These are formal statements of certifications by manufacturers which warrant to the Owner that products and equipment are free from defects in material and workmanship.
    - 2) These are standard warranties issued with products and equipment which supplement the Contractor's warranty and may also extend coverage past the expiration of the Contractor's warranty.
    - 3) Include with the manufacturer's warranty data shall be a notification of the availability of an extension to the standard warranty including terms.
  - b. Special Express Warranties
    - 1) The form, format, and conditions of special warranties are described in the various specification sections of the Contract Documents.
    - 2) These are formal warranties above and beyond the Contractor's warranty and manufacturer's standard warranties.
    - 3) These warranties may be based on performance, power consumption, maintenance projects, or other operating parameters.



- 4) Extended warranties, service contracts, and performance bonds are also included under this category.
  2. Term or Period
    - a. Unless otherwise established by individual sections in Divisions 2 through 44, all Contractor express warranties shall extend for 1 calendar year from the date of substantial completion of the project or acceptance date of the product or portion of work thereof, whichever is the later date.
  3. Content of Warranty
    - a. The warranty shall contain, as applicable:
      - 1) Effective starting date of the warranty period.
      - 2) Statement of the terms and conditions of the warranty, if any.
- L. Project Record Documents
  1. Project record documents are to be in accordance with the Contract General Conditions.
  2. Contractor shall maintain in a safe place at the Site **one record copy** of all Drawings, Specifications, Addenda, Approved Shop Drawings, Change Orders, Work Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings shall be delivered to Engineer for Owner.
  3. Record Contract Drawings
    - a. Legibly mark contract drawings to record actual construction including:
      - 1) Depths of various elements of foundation in relation to data.
      - 2) Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
      - 3) Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
      - 4) Field changes of dimension and detail.
      - 5) Changes made by change order or field order.
- M. Extra Materials/Spare Parts
  1. Coat or package extra materials to prevent corrosion or deterioration during long-term indoor storage.
  2. Clearly label all packaging with:
    - a. Part name.
    - b. Part number.
    - c. Associated equipment name and number.
    - d. Manufacturer's name and address.
    - e. The required storage environment for the materials.
- N. Other. These include special tools/repair parts list, photographs, videos, certificates, construction schedules, drawings, reports, meeting minutes, data, and information required

by the Contract Documents which do not logically fall into the submittal types defined above.

### **PART 3 - EXECUTION**

#### **3.01 DELIVERY, STORAGE, & HANDLING**

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.
- B. Store and protect large samples and mock-ups until the Project is completed, then properly dispose of off-site.
- C. Maintain and make available to the Owner and Engineer, at the job site, a complete file of all approved submittals as part of the project record documents.

#### **3.02 SUBMITTAL PREPARATION AND TRANSMITTAL**

- A. Coordination
  - 1. Coordinate preparation and processing of submittals with performance of construction activities.
  - 2. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay and in accordance with the submittal schedule.
  - 3. The General Contractor is responsible for resolving any disputes between General Contractors over submittals.
- B. Verification
  - 1. Verify the correctness and completeness of all submittals prior to forwarding same for review.
  - 2. All submittals shall comply with the Contract Documents.
- C. Package each submittal appropriately for transmittal and handling including a transmittal form.
- D. The General Contractor shall submit the minimum number of submittals as listed in paragraph 3.3 of this specification.
- E. Submittals received from sources other than the General Contractor will be returned without action.
- F. Other General Contractors shall submit all submittals through the General Contractor.

#### **3.03 ENGINEER REVIEW AND ACTION**

- A. General
  - 1. Except for submittals for record, information, or similar purposes where action and return is not required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly.
  - 2. Cost to review any submittal more than twice will be deducted from Contractor's monthly estimates and final payments.
  - 3. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Action Stamp

1. The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate action taken.
  - a. Final Unrestricted Release. Where submittals are marked "Approved," that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  - b. Final-but-Restricted Release. When submittals are marked "Approved as Noted," that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
2. Returned for Resubmittal
  - a. When submittal is marked "Not Approved" and/or "Revise and Resubmit," do not proceed with that part of the work covered by the submittal, including purchasing, fabrication, delivery, or other activity.
  - b. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
  - c. Do not permit submittals marked "Not Approved" and/or "Revise and Resubmit" to be used at the project site or elsewhere where work is in progress.

#### 3.04 SUBMITTALS AND DISTRIBUTION

- A. Submittals shall be made electronically through an Owner provided SharePoint site which will be discussed during the Project's Kickoff Meeting. The Contractor shall initiate the workflow by uploading the electronic submittal and input the necessary information required into the Owner's Submittal Transmittal Template which shall include the following information. If the submittal includes a sample, or object that cannot be transmitted electronically, then the Contractor shall complete the Submittal Transmittal with the a description of what was provided to the Owner for review for documentation purposes and comments will be made through the submittal as needed.
  1. Project Name
  2. Owner's Project Number, if applicable
  3. Submittal Number
  4. Specification and/or Drawing Reference Number
  5. Date of Submittal
  6. Submittal Description.
- B. The Contractor will receive a notification once the Submittal has been reviewed with responses electronically provided through the workflow setup during the kickoff meeting.
  1. Upon approval of submittal, the Contractor shall provide a minimum of three (3) hard copies of each Submittal to provide to the Owner's Construction Supervisor within ten (10) days prior to the start of the activity for inspection and field purposes. The Submittal will be considered complete after it receives an "Approved" or "Approved as Noted" designation.

#### 3.05 SPECIFIC SUBMITTAL – TYPE EXECUTION REQUIREMENTS

- A. O&M Manuals
  1. Submittal Procedure

- a. Submit one initial copy of the O&M manual for review. After approval of the initial copy, submit the remainder of the revised manuals.
2. Verification
    - a. Verify the accuracy of the initial O&M manual by visual and physical inspection of the installed equipment during start-up.
      - 1) Perform field verification in the presence of the Owner or Owner's Representative.
      - 2) Physically trace and document as required all wiring and piping.
      - 3) Visually inspect equipment and components and compare configurations and nameplate information to O&M manual.
      - 4) Make any changes, additions, or deletions to the O&M manual identified during field verification.
      - 5) In the event changes are made to the equipment following field verification, submit a final supplement of the revisions of the O&M manuals before approval.
- B. Sample Panels
    1. Construct any required sample panels on-site.
    2. Construct sample panels only after the individual samples and components used in the sample panel have been approved.
    3. If a sample panel does not conform to the Contract requirements, construct additional ones until conformance is achieved.
- C. Samples for Tests
    1. Furnish samples of material as may be required for examination and test. Take all samples of materials for tests according to standard methods or as provided in the Contract Documents.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 35 23**  
**HEALTH AND SAFETY PROVISIONS**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment, and incidentals for all health and safety provisions.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Codes
  - 1. Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with the plans and as specified herein.
    - a. Standards
    - b. Manual of Accident Prevention in Construction published by Associated General Contractors of America.
    - c. Occupational Safety & Health Administration's (OSHA's) confined-space entry procedures.
    - d. Applicable state or federal occupational health and safety standards.
    - e. Other reasonable safety rules and practices established.

1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Contractor to provide the Project Safety Program, Emergency Response Plan, and Confined Space Entry Program within thirty (30) days prior to the start of construction activities. Plan shall include, if applicable, the following:
  - 1. Arrangements made with local authorities or emergency service providers (fire, police, ambulance) that will be implemented in the event of an emergency
  - 2. Resume of the safety coordination qualifications and experience.
- C. Submit copies of accident reports, OSHA citations, and accident claims as applicable.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

3.02 SAFETY COORDINATOR

- A. Contractor shall provide a person who, in addition to their other construction duties, will act as the safety coordinator for the work of this contract including but not limited to health and safety considerations associated with the work. The safety coordinator shall have experience in safety and health aspects of construction work, shall work on improving the safety and health of people involved in, and in the proximity of, the work of this Contract, and be on the job site during all normal work hours. The safety coordinator shall cooperate with the site Lead Safety Coordinator if one is designated by the Owner or Engineer.

3.03 PROJECT SAFETY PROGRAM

- A. All personnel onsite shall be able to complete their work safely that will not endanger their own health nor the health of others. Safety Coordinator shall ensure all personnel onsite is aware of inherent hazards onsite, precautions that should be taken, and emergency procedures.
- B. Contractor's safety coordinator shall establish a safety program for the job site, the safety program shall include:
  - 1. A list of general and specific safety guidelines for each trade.
  - 2. A training program for instructing each worker to recognize and avoid unsafe conditions and to apply good safety and health practices.
  - 3. A system for ensuring that machinery and equipment are operated only by qualified people.
  - 4. A system for tagging and removing unsafe machinery, equipment, tools, and goods.
  - 5. A system for investigating each injury and reporting its cause and the steps taken to prevent recurrence to the Owner.
  - 6. A system for implementing use of personal protective equipment, as necessary.
  - 7. Address the availability and maintenance of safety and rescue equipment such as fire extinguishers, first aid kits, safety ropes and harnesses, stretchers, breathing apparatus, resuscitators, gas detectors, and other equipment required by law.
  - 8. If applicable, include a lockout-tagout practices for work related to motor driven equipment and electrical systems.
- C. Contractor shall review the safety program with the Owner's Representative before commencement of any activity on the job site.

3.04 EMERGENCY RESPONSE PLAN

- A. The emergency response plan shall include the following:
  - 1. Key personnel to contact with their roles and responsibilities
  - 2. List of telephone numbers of key personnel for the Contractor, Owner, and Engineer

3. Specify the emergency command center with established lines of communication between the incident location and the command center. Telephone numbers to also be provided with a map to the nearest hospital.
4. Define procedures for emergency evacuation to ensure all injured persons are not left behind or unaccounted for.
5. The Owner and Engineer shall be notified immediately in the event of an emergency.

3.05 CONFINED SPACE ENTRY

- A. Anyone entering storage tanks or similarly confined areas shall comply with OSHA's Confined Space Entry Regulations.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION



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**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND SERVICES**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. The General Contractor shall be responsible for usage charges for temporary utilities. These utilities include water service, electric power service, and natural gas service for temporary heat. Other entities using temporary services and facilities include, but are not limited to:
1. Other subcontractors.
  2. The Owner's work forces.
  3. Occupants of the project.
  4. The Engineer/Architect.
  5. Testing agencies.
  6. Personnel of government agencies.
- B. Temporary construction services and facilities include the following.
1. Temporary utilities required include, but are not limited to:
    - a. Water service and distribution.
    - b. Temporary electric power and light.
    - c. Telephone service.
    - d. Public and private utilities coordination
    - e. Storm and sanitary sewer.
  2. Temporary construction and support facilities required include, but are not limited to:
    - a. Hoists and temporary elevator use.
    - b. Temporary heat.
    - c. Field offices and storage sheds.
    - d. Temporary roads and paving.
    - e. Sanitary facilities, including drinking water.
    - f. Temporary enclosures.
    - g. Temporary project identification signs and bulletin boards.
    - h. Waste disposal services.
    - i. Construction aids and miscellaneous services and facilities.
    - j. Dewatering facilities and drains.
    - k. Rodent and pest control.
  3. Security and protection facilities required include, but are not limited to:
    - a. Temporary fire protection.
    - b. Barricades, warning signs, lights.
    - c. Enclosure fencing for the work area.

- d. Environmental protection.
  - e. Security enclosure and lockup.
  - f. Control of noise
  - g. Dust control.
- C. Conditions of Use
- 1. Keep temporary services and facilities clean and neat in appearance.
  - 2. Operate in a safe and efficient manner.
  - 3. Take necessary fire-prevention measures.
  - 4. Do not overload facilities.
  - 5. Do not allow hazardous, nuisance, or unsanitary conditions to develop or persist on the site.
  - 6. Do not permit facilities to interfere with progress.
  - 7. The installer of each permanent service or facility shall assume responsibility for its operation, maintenance, and protection during its use as a construction service or facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.
  - 8. At the earliest feasible time, when acceptable to Owner, change over from use of the temporary service to use of the permanent service.
- D. Division of Responsibilities
- 1. General
    - a. Each General Contractor is assigned specific responsibilities for certain temporary services and facilities used by other Prime Contractors and other entities at the site.
    - b. The General Contractor is responsible for providing temporary services and facilities that are:
      - 1) Not normal construction activities of other Prime Contractors.
      - 2) Not specifically assigned otherwise in the Contract Documents.
      - 3) Listed as a responsibility for another Prime Contractor that does not exist on this project.
  - 2. Each Contractor and Subcontractor is responsible for:
    - a. Installation, operation, maintenance, and removal of each temporary service or facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each such service or facility.
    - b. Plug-in electric power cords and extension cords, and supplementary plug-in task lighting and special lighting necessary exclusively for its own activities.
    - c. Its own field office, complete with necessary furniture, utilities, and telephone service.
    - d. Access to record documents as described in Section 01 33 00 – Submittals.
    - e. Its own storage and fabrication sheds.

- f. Temporary heat, ventilation, humidity control, and enclosure of the building where these utilities are necessary for its construction activity, but where these utilities have not yet been installed by the responsible Prime Contractor.
  - g. Special or unusual hoisting requirements, including hoisting loads in excess of 2-tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure.
  - h. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
  - i. Secure lockup of its own tools, materials and equipment.
  - j. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
3. The General Contractor is responsible for:
- a. Temporary telephone service for Contractor and Subcontractors.
  - b. Temporary roads and paving.
  - c. Temporary toilets, including disposable supplies.
  - d. Temporary wash facilities, including disposable supplies.
  - e. Containerized bottled water type drinking water units.
  - f. Temporary enclosure of the building.
  - g. Project identification and temporary signs.
  - h. General collection and disposal of wastes.
  - i. Barricades, warning signs, and lights.
  - j. Enclosure fence.
  - k. Security enclosure and lockup.
  - l. Environmental protection.
4. The Plumbing Contractor, if applicable, is responsible for:
- a. Temporary water service.
  - b. Temporary gas service.
5. The Heating, Ventilating, and Air Conditioning (HVAC) Contractor, if applicable, is responsible for:
- a. Temporary heat, upon enclosure of the building.
  - b. Temporary ventilation, upon enclosure of the building.
6. The Electrical Contractor, if applicable, is responsible for:
- a. Temporary electric power service and distribution.
  - b. Temporary lighting.
  - c. Connections for illuminated signs.

## 1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

### 1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Regulations
  - 1. Comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:
    - a. Building code requirements.
    - b. Health and safety regulations.
    - c. Utility company regulations.
    - d. Police, fire department, and rescue squad rules.
    - e. Environmental protection regulations.
    - f. Owner Safety and Security Requirements.
- C. Standards
  - 1. Comply with National Fire Protection Association (NFPA) Code 241, "Building Construction and Demolition Operations"; American National Standards Institute (ANSI) A10 Series standards for "Safety Requirements for Construction and Demolition"; and National Electrical Contractors Association (NECA) Electrical Design Library "Temporary Electrical Facilities."
    - a. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services" prepared jointly by Associate General Contractors of America (AGC) and Adhesive and Sealant Council, Inc. (ASC) for industry recommendations.
    - b. Electrical Service. Comply with National Electrical Manufacturers Association (NEMA), National Electrical Contractors Association (NECA), and Underwriters' Laboratories, Inc. (UL) standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NEC) (NFPA 70).
- D. Inspections
  - 1. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits and keep on file for Owner review.

### 1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Temporary Utilities. Submit a schedule indicating dates for implementation and termination of each temporary utility.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS (NOT USED)

2.02 MATERIALS

- A. General. Provide new materials, if acceptable to Owner or Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the intended use.
- B. Water. Provide potable water approved by local health authorities.
- C. Open Mesh Fencing. Provide 11-gauge, galvanized 2-inch, chain-link fabric fencing 6 feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2-inch inside diameter (I.D.) for line posts, and 2-1/2-inch I.D. for corner posts.
- D. Seed, fertilizers, mulches, sod shall comply with Section 32 90 02, "Grading and Seeding".
- E. Traffic Control shall comply with Contract Documents.

2.03 EQUIPMENT

- A. General. Provide new or acceptable previously used equipment. Provide equipment suitable for the use intended.
- B. Fire Extinguishers
  - 1. Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces.
  - 2. In other locations provide hand-carried, portable, class "ABC" dry-chemical extinguishers, or a combination of extinguishers of NFPA recommended types for the exposures.
  - 3. Comply with NFPA 10 and 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

3.02 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities.
- B. Coordinate location with Owner and Engineer/Architect. Locate facilities where they serve the project adequately and result in minimum interference with performance of construction activities. Relocate facilities as required.
- C. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.03 TEMPORARY UTILITY INSTALLATION

- A. Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
  - 1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
  - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
  - 3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
- B. Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. Disinfect temporary water piping prior to use.
- C. Temporary Electric Power Service
  - 1. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction.
  - 2. Include meters, transformers, overload protected disconnects, automatic ground fault interrupters, and main distribution switch gear.
  - 3. Power Distribution System. Install wiring overhead, and raise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125-Vac 20-ampere rating and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- D. Temporary Lighting
  - 1. Whenever an overhead floor or roof deck has been installed, install temporary lighting with local switching.
  - 2. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire lighting system, and will provide adequate illumination for construction operations and traffic conditions.
- E. Temporary Internet and Cell Service
  - 1. Provide temporary internet and cell service for all personnel engaged in construction activities, throughout the construction period.
  - 2. Install telephone on a separate line for each temporary office and first aid station. A temporary telephone landline shall be installed to the temporary facility if there is no cellular service in the area.
  - 3. At each telephone, post a list of important telephone numbers.
- F. Sewers and Drainage
  - 1. If sewers are available, provide temporary connections to remove influent that can be discharged lawfully.
  - 2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities.
  - 3. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

4. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
  5. Connect temporary sewers to the municipal system as directed by the sewer department officials.
  6. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
- G. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

### 3.04 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

- A. Provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity.
1. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
  2. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
  3. Provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
  4. Do not use gasoline-burning space heaters, or open-burning or salamander-type heating units.
- B. Field Offices
1. Provide an insulated, weathertight, heated, or air-conditioned temporary office of sufficient size to accommodate required office personnel at the project site.
  2. The General Contractor shall provide, either as a part of its field office or as a separate facility, a room of not less than 240 square feet (sf) for project meetings.
  3. Furnish the room with a conference table, eight folding chairs, and a tackboard.
  4. Keep the office clean and orderly.
- C. Storage and Fabrication Sheds
1. Install storage and fabrication sheds, sized, furnished, and equipped to accommodate materials and equipment including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.
- D. Sanitary facilities include temporary toilets, wash facilities, and drinking water fixtures.
1. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities.
  2. Install where facilities will best serve the project's needs.
  3. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
  4. Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
  5. Provide bottled-water-type drinking water units.



6. Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. Temporary Enclosures
1. Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
    - a. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
    - b. Install tarpaulins securely, with fire-treated wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
    - c. Close openings through floor or roof decks and horizontal surfaces with load bearing wood framed construction.
- F. Project Identification and Temporary Signs
1. Temporary Signs. Prepare signs to provide directional information to construction personnel and visitors.
  2. Support on posts or framing of preservative-treated wood or steel.
  3. Do not permit installation of unauthorized signs.
- G. Temporary Site Lighting
1. Install exterior yard and sign lights so that signs are visible when work is being performed.
- H. Collection and Disposal of Waste. See Section 01 74 23, "Cleaning."
- I. Stairs
1. Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
  2. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.
- J. Rodent and Pest Control
1. Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests.
  2. Employ this service to perform extermination and control procedures at regular intervals so the project will be relatively free of pests and their residues at Substantial Completion.
  3. Perform control operations in a lawful manner using environmentally safe materials.

### 3.05 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested.
- B. Temporary Fire Protection

1. Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.
  2. Comply with NFPA 10, "Standard for Portable Fire Extinguishers," and NFPA 241, "Standard for Safeguarding Construction, Alterations and Demolition Operations."
  3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  4. Store combustible materials in containers in fire safe locations.
  5. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
  6. Prohibit smoking in hazardous fire exposure areas.
  7. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection
1. At the earliest feasible date in each area of the project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, Warning Signs, and Lights
1. Comply with standards and code requirements for erection of structurally adequate barricades.
  2. Paint with appropriate colors, graphics, and warning signs to warn personnel and the public of the hazard.
  3. Where needed, provide lighting including flashing lights.
- E. Enclosure Fence
1. When excavation begins, install an enclosure fence with lockable entrance gates.
  2. Locate where indicated, or enclose the portion determined sufficient to accommodate construction operations.
  3. Install in a manner that will prevent people and animals from easily entering the site, except by the entrance gates.
  4. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.
- F. Security Enclosure and Lockup
1. Install substantial temporary enclosure of partially completed areas of construction.
  2. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
  3. Storage of Valuable Material. Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Environmental Protection
1. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility

that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result.

2. Avoid use of tools and equipment which produce harmful noise.
3. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

### 3.06 OPERATION, TERMINATION AND REMOVAL

A. Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance

1. Maintain facilities in good operating condition until removal.
2. Protect from damage by freezing temperatures and similar elements.
3. Maintain operation of temporary construction services and facilities on a 24-hour-day basis where required to achieve indicated results and to avoid possibility of damage.
4. Prevent water filled piping from freezing. Maintain markers for underground lines.
5. Protect from damage during excavation operations.

C. Termination and Removal

1. Unless requested that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion.
2. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility.
3. Repair damaged work, clean exposed surfaces, and replace work which cannot be satisfactorily repaired.
4. Materials and facilities that constitute temporary facilities are property of each Prime Contractor. The Owner reserves the right to take possession of project identification signs.
5. Temporary Pavement
  - a. Remove temporary paving that is not intended for or acceptable for integration into permanent paving.
  - b. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area.
  - c. Remove materials contaminated with road oil, asphalt and other petrochemical compounds and other substances which might impair growth of plant materials or lawns.
  - d. Repair or replace street paving, curbs, and sidewalks at the temporary entrances, as required by the governing authority.
6. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
  - a. Replace air filters and clean inside of ductwork and housings.
  - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.

- c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 65 00**  
**DELIVERY, STORAGE, AND HANDLING**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required for delivery, storage and handling.
- B. Products shall include, but not limited to, purchased items for incorporation to complete the work, regardless of whether specifically purchased for the project or taken from the Contractor's stock previously purchased. Materials shall include, but not limited to, objects substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, installed, or applied to complete the work. Equipment shall include, but not limited to, operational parts, regardless of whether motorized or manually operated, and particular products with service connections (Wiring, piping, and other like items.
- C. Transport and handle materials and equipment in accordance with the manufacturer's recommendations and requirements of Contract Documents. Make all arrangements for transportation, delivery, storage, and handling of equipment and materials required for prosecution and completion of the work.
  - 1. No payment will be made to the Contractor for equipment or materials not properly stored and insured or without approved Shop Drawings. Previous payments for items will be deducted from subsequent progress estimate(s) if proper storage procedures are not observed.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Contractor shall provide products, materials, and equipment of a single generic kind from a single source from the greatest extent possible. Where more than one choice is available as options, Contractor shall select an option which is compatible with other products, materials, or equipment, compatibility is a basic general requirement.

1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

B. Delivery

1. Deliver shipments of materials and equipment to the site only during regular working hours. Shipments shall be addressed and consigned to the proper party giving name of Contract, street number, and city.
  - a. Shipments shall not be delivered to the Owner or Owner's Representative, except as otherwise directed.
  - b. Schedule delivery of products or equipment as required to allow timely installation and to avoid prolonged storage.
  - c. Clearly and fully mark and identify as to manufacturer, item, and installation location.
2. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packing. The Contractor shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage. Owner will not unload, accept, or handle deliveries to the project site.
3. Transportation shall be as specified herein.

C. Storage and Handling

1. Store, handle, and protect materials in accordance with the manufacturer's recommendations and the requirements of Part 3 of this section.
2. Maintain equipment in an undeteriorated and fully serviceable condition and as specified in Part 3 of this section.
3. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within the tolerances required by the manufacturer's recommendations.
4. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation to avoid condensation.
5. Products shall be maintained (rotated, lubricated, etc.) as recommended by the manufacturer and a log of services shall be maintained and submitted as Record Document prior to final acceptance by the Owner.

3.02 TRANSPORTATION AND INSPECTION

- A. Arrange deliveries of products in accordance with the construction schedule and in ample time to facilitate inspection prior to installation.
- B. Coordination
  1. Coordinate deliveries to avoid conflict with work and conditions at site and to accommodate the following:
    - a. Work of other contractors.
    - b. Limitations of storage space.
    - c. Availability of equipment and personnel for handling products.
    - d. Owner's use of premises.
  2. Do not have products delivered to project site until related shop drawings have been approved and required storage facilities have been provided.

3. Have products delivered to site in manufacturer's original, unopened, labeled containers. Keep Engineer and Owner informed of delivery of all equipment to be incorporated in the work.

C. Inspection

1. Immediately upon delivery, inspect shipment to ensure that:
  - a. Product complies with requirements of Contract Documents and reviewed submittals.
  - b. Quantities are correct.
  - c. Containers and packages are intact and labels are legible.
  - d. Products are properly protected and undamaged.
  - e. Damaged products are rejected and removed from the site.

3.03 HANDLING

A. Methods

1. Provide equipment and personnel necessary to handle products without soiling or damaging products or packaging.
2. Lift heavy components only at designated lifting points.
3. Handle materials and equipment at all times in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them.
4. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.
5. Keep interiors completely free of dirt and foreign matter.

3.04 STORAGE AND PROTECTION

A. General

1. Make all arrangements and provisions necessary for the storage of materials and equipment and arrange in a manner to provide easy access for inspection. Keep materials and equipment neatly and compactly stored in locations that will cause a minimum of inconvenience to other contractors, public travel, adjoining owners, tenants, and occupants.
2. Place all excavated materials, construction equipment, materials and equipment to be incorporated into the work so as not to damage anything.

B. Storage Areas

1. Areas available on the construction site for storage of material and equipment shall be as required herein and otherwise approved.
2. Store materials and equipment which are to become the property of the Owner in a way to facilitate their inspection and ensure preservation of the quality and fitness of the work, including proper protection against damage by freezing and moisture.
3. Lawns or other private property shall not be used for storage purposes without written permission of the Owner in control of such premises. Restore all storage areas to their original condition, if applicable.

C. Storage Methods



1. Do not open manufacturer's containers until the time of installation unless recommended by the manufacturer or otherwise specified.
2. Do not store products in the structures being constructed unless approved in writing.
3. The following types of materials may be stored out-of-doors and on wood blocking so there is no contact with the ground.
  - a. Masonry units.
  - b. Reinforcing steel.
  - c. Structural steel.
  - d. Piping.
  - e. Precast concrete items.
  - f. Castings.
  - g. Handrailing.
4. The following types of materials may be stored out-of-doors if covered with material impervious to water and sunlight. Store materials on wood blocking and tie down covers with rope and slope to prevent accumulation of water on covers.
  - a. Construction lumber.
  - b. Wood for formwork.
  - c. Fiberglass and plastic materials which are not ultraviolet (UV) protected.
5. Store all products not listed above in buildings or trailers which have a concrete or wooden floor, a roof, and fully closed walls on all sides.
6. Provide heated storage space for materials that would be damaged by freezing.
7. Protect mechanical and electrical equipment from contamination by dust, dirt, and moisture and maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.
8. If required for the project or deemed necessary by the Contractor and approved by the Owner, a temporary building may be constructed with location coordinated and approved by the Owner. The building shall include lockable doors, lighting, and electrical service for equipment for heating or ventilation as necessary to provide storage environments acceptable to the equipment that will be stored inside per the manufacturer's recommendations.

D. Inspection

1. Regularly inspect stored products to ensure that:
  - a. State of storage facilities is adequate to provide required conditions.
  - b. Required environmental conditions are maintained on continuous basis.
  - c. Products exposed to elements are not adversely affected.
2. Be fully responsible for loss or damage to stored materials and equipment.

3.05 MAINTENANCE

- A. Prepare a maintenance log for all equipment that includes a list of required maintenance services and inspections, as provided by the manufacturer. The log shall include checklists for the periodic services and inspections required.

1. Initial and date the checklist upon completion of the individual servicing or inspection.
  2. Locate the maintenance log in the field office and have it available for review until it is submitted for record purposes upon completion of the work and the start of the warranty period.
- B. Before moving equipment to the installed location; review the installation location and ensure temporary shelter is established, if required to sit more than a typical working day in a temporary location, to maintain the proper storage environment is maintained per manufacturer's recommendations
- C. Perform all storage and preventive maintenance and inspections required by the manufacturer at the specified intervals from the time of delivery until completion of the work. When notified by the Owner or Owner's Representative of a maintenance deficiency, perform corrective maintenance. Corrective maintenance shall be performed per the manufacturer.
1. Reestablish storage maintenance in the event an item or equipment is removed from service.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 73 29**  
**CUTTING AND PATCHING**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required for the cutting and patching of existing construction where shown on the Contract Drawings, or as required to accommodate work shown or specified.
- B. Perform preliminary investigations as required to ascertain extent of work and coordinate and schedule work as required to preclude interference with other operations.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Refer to other sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.
  - 1. Section 02 41 19 - Selective Demolition
  - 2. Section 03 30 00 – Cast-In-Place Concrete
  - 3. Division 26 - Electrical

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Requirements for Structural Work. Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load deflection ratio. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements:
  - 1. Foundation construction.
  - 2. Bearing and retaining walls.
  - 3. Structural concrete.
  - 4. Structural steel.
  - 5. Lintels.
  - 6. Timber and primary wood framing.
  - 7. Structural decking.
  - 8. Stair systems.
  - 9. Miscellaneous structural metals.
  - 10. Exterior curtain wall construction.
  - 11. Equipment supports.
  - 12. Piping, ductwork, vessels, and equipment.
  - 13. Structural systems of special construction in Division 13, if provided.

- C. Operational and Safety Limitations. Do not cut and patch operating elements or safety-related components in a manner that would result in reducing their capacity to perform as intended or result in increased maintenance or decreased operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety-related systems:
    - a. Shoring, bracing, and sheeting.
    - b. Primary operational systems and equipment.
    - c. Air or smoke barriers.
    - d. Water, moisture, or vapor barriers.
    - e. Membranes and flashings.
    - f. Fire protection systems.
    - g. Noise and vibration control elements and systems.
    - h. Control systems.
    - i. Communication systems.
    - j. Conveying systems.
    - k. Electrical wiring systems.
    - l. Special construction specified by Division 13 sections.
- D. Visual Requirements. Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer/Architect's opinion, reduce the building's aesthetic qualities or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.
- a. If possible, retain the original installer or fabricator to cut and patch the following categories of exposed work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm.
    - 1) Processed concrete finishes.
    - 2) Stonework and stone masonry.
    - 3) Ornamental metal.
    - 4) Matched veneer woodwork.
    - 5) Preformed metal panels.
    - 6) Window wall system.
    - 7) Stucco and ornamental plaster.
    - 8) Acoustical ceilings.
    - 9) Terrazzo.
    - 10) Finished wood flooring.
    - 11) Fluid applied flooring.
    - 12) Carpeting.
    - 13) Aggregate wall coating.
    - 14) Wall covering.

- 15) Swimming pool finishes.
- 16) Heating, ventilating, and air conditioning (HVAC) enclosures, cabinets, or covers.

#### 1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Submittal Package No. 1 – Cutting and Patching Proposal
  1. Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal.
    - a. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
    - b. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.
    - c. List products to be used and firms or entities that will perform work.
    - d. Indicate dates when cutting and patching are to be performed.
    - e. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
  2. Approval to proceed with cutting and patching does not waive the right to later require complete removal and replacement of a part of the work found to be unsatisfactory.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS (NOT USED)

#### 2.02 MATERIALS

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.
- B. Temporary Partitions:
  1. Plywood shall be ½-inch minimum for interior or exterior use
  2. Paneling shall be ¼-inch minimum for interior use only.
- C. Refer to Section 03 30 00, “Cast-On-Place Concrete,” for concrete requirements.

### **PART 3 - EXECUTION**

#### 3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, “Delivery, Storage, and Handling”, and the manufacturer’s instructions.

### 3.02 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed. Take corrective action before proceeding if unsafe or unsatisfactory conditions are encountered.

### 3.03 PREPARATION

- A. Provide temporary support of work to be cut and maintain temporary partitions as required with braced plywood in exterior areas and braced paneling for interior areas. Bracing shall be set up to maintain safety, stability and to resist all loads to which the structure may be subjected.
- B. Provide and maintain barricades, safety lights as required, and maintain covered passageways where necessary. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- C. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the project that might be exposed during cutting and patching operations.
- D. Take all precautions necessary to avoid cutting existing pipe, conduit, or ductwork serving the building but scheduled to be removed or relocated until provisions have been made to bypass them.

### 3.04 PERFORMANCE

#### A. General

- 1. Employ skilled workmen to perform cutting and patching.
- 2. Proceed with cutting and patching at the earliest feasible time and complete without delay.
- 3. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

#### B. Cutting

- 1. Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
  - a. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - b. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
  - c. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
  - d. Bypass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated, or abandoned. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.

#### C. Patching

1. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - a. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
  - b. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - c. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance.
  - d. Remove existing floor and wall coverings and replace with new materials if necessary to achieve uniform color and appearance.
  - e. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
  - f. Patch, repair, or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

### 3.05 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching are performed or used as access. Remove completely paint, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit, and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

### **PART 4 - SCHEDULE (NOT USED)**

END OF SECTION



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## SECTION 01 74 23

### CLEANING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION OF WORK

- A. Scope of Work. Throughout the construction period, maintain all areas of existing buildings and site constructed or affected by the work in a standard of cleanliness as described herein and Contract Documents. This shall include, but not limited to, progress cleaning (as condition precedent to Substantial Completion), completion of Work, and as required by the General Conditions, this specification, and elsewhere in the Contract Documents.
  - 1. All surfaces shall be cleaned as required by product supplier prior to completing the work required. If the supplier does not recommend specific cleaning agent(s) or methods, use cleaning agents and methods that are not hazardous to health and safety of the personnel and will not damage exposed surfaces.
- B. Related Work Described Elsewhere. In addition to standards described in this section, comply with all requirements for cleaning up as described in various other sections of these specifications.

##### 1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

##### 1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Inspection. Conduct daily inspections, and more often if necessary, to verify that requirements of cleanliness are being met.
- C. Codes and Standards
  - 1. In addition to the standards described in this section, comply with all pertinent requirements of governmental agencies having jurisdiction and comply with Occupational Safety and Health Administration (OSHA) Housekeeping Standards, Subpart C, Section 1926.25.

##### 1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.

##### 1.05 SPECIAL WARRANTY (NOT USED)

#### PART 2 - PRODUCTS

##### 2.01 MANUFACTURERS (NOT USED)

##### 2.02 MATERIALS AND EQUIPMENT

- A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

## 2.03 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

## PART 3 - EXECUTION

### 3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

### 3.02 EXAMINATION

#### A. General

1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of the work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Comply with OSHA Section 1926-252 of Subpart H of Part 1926, Disposal of Waste Materials.
5. Provide adequate storage for all items awaiting removal from job site, observing all requirements for fire protection and protection of the environment.
6. Do not bury waste materials within the project site.
7. Comply with NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations," for removing combustible waste materials and debris.
8. Do not hold non-combustible materials at the Site more than three (3) days if the ambient air temperature is expected to rise above 80 DEGF. When ambient air temperature is less than 80 DEGF, dispose of non-combustible materials within seven (7) days of their generation.
9. Containerize hazardous and unsanitary waste materials separately from other waste and label containers appropriately.
10. Clean areas where the Work is in progress to maintain an extent of cleanliness necessary for proper execution of the Work and safety of personnel.
11. Remove waste material and rubbish from excavations before backfill and do not burn or bury waste materials at the site.

#### B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site; restack, tidy, or otherwise service all arrangements to meet the requirements of herein.
3. Maintain the site in a neat and orderly condition at all times and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

4. Keep outdoor dust generating areas wetted down or otherwise control dust emissions as required by Contract Documents.

C. Structures

1. Weekly, and more often if necessary, inspect the structures, pick up all scrap, debris, and waste material.
2. Weekly, and more often if necessary, sweep all interior spaces clean. Interpret "Clean" (for the purpose of this subparagraph) as meaning free from dust and other material capable of being removed by use of reasonable effort and hand-held broom, except that vacuum cleaning shall also be employed if dust accumulates on surfaces above floor.
3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
4. Following the installation of finish floor materials, clean finish floor daily (and more often if necessary) while work is being performed in the space. Interpret "clean" (for the purpose of this subparagraph) as meaning free from all foreign material which may be damaging to the finish floor material.
5. Remove waste material and debris from concealed spaces and vaults before enclosing the space.

3.03 FINAL CLEANING

A. Definition

1. Except as otherwise specifically provided, interpret "clean" (for the purpose of this paragraph) as meaning the level of cleanliness generally provided by skilled cleaners using commercial-quality building maintenance materials.

B. General

1. Prior to completion of the work, remove from the job site all tools, surplus and testing materials, equipment, scrap, debris, temporary protection, and waste. Conduct final cleaning as described herein.
  - a. Clean installed surfaces (floors, walls, ceiling, equipment, piping, etc) according to written instructions of the manufacturer or fabricator of installed materials and equipment, using only cleaning agents and methods specifically recommended by material or equipment supplier. This is applicable to all existing and proposed surfaces.
    - 1) If the supplier does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and safety of the personnel and will not damage exposed surfaces.
2. All work associated with Final Cleaning of site shall include, but not limited to the following:
  - a. Leave the work site and adjacent areas affected in a clean condition satisfactory to the Owner.
  - b. Remove all waste associated with construction work.
  - c. Remove grease, dirt, dust, paint, or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.

- d. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
  - e. Clean all windows.
  - f. Clean and wax wood, vinyl, or painted floors.
  - g. House clean sidewalks, loading areas, and others contiguous with principal structures.
  - h. Rake clean all other surfaces.
  - i. Remove snow and ice from access to buildings.
  - j. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
  - k. Leave water courses, gutters, and ditches open and clean with no obstructions.
- C. Site. Unless otherwise directed, broom-clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris and all temporary erosion control measures.
- D. Structures
- 1. Exterior
    - a. Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter.
    - b. Remove all traces of splashed materials from adjacent surfaces.
    - c. If necessary to achieve a uniform degree of exterior cleanliness, hose and brush down the exterior of the structure.
    - d. In the event of stubborn stains not removable with water, lightly sandblast to remove the stain in accordance to manufacturer's or Engineer's recommendations.
  - 2. Interior
    - a. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter.
    - b. Remove all traces of splashed materials from adjacent surfaces.
    - c. Remove all paint droppings, spots, stains, and dirt from finished surfaces.
    - d. Sweep, vacuum, and hand-dust all areas, including concealed surfaces and overhead spaces, to remove all dust.
  - 3. Clean all glass inside and outside.
  - 4. To all surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

**SECTION 01 75 16**  
**EQUIPMENT TESTING AND COMMISSIONING**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

A. Scope of Work.

1. Equipment startup and testing shall be performed for the following pieces of equipment. The startup of equipment may be a complex operation requiring the combined expertise of the Contractor, manufacturers' representative, subcontractors, Owner, and the Engineer. The Contractor is responsible for coordination of all parties for a successful startup.
  - a. High Service Pump #3 with VFD And New Pump Motor
  - b. Flow Control Valve
  - c. SCADA Addition
2. All Work under this Section shall be scheduled according to Section 01 32 16, "Construction Schedule", and in a manner to comply with Section 01 11 00, "Summary of Work."
3. All Equipment Testing and Commissioning required by the Contract Documents must be submitted in accordance with Section 01 33 00, Submittals, and shall have received an acceptable disposition by the Engineer prior to issuance of the Certificate of Substantial Completion.
4. Startup shall consist of the following series of activities required for each type of equipment that is part of this project:
  - a. Functional Testing
  - b. Performance and Systems Integration Testing
  - c. Operational Demonstration Testing
  - d. Submittal of Equipment Startup Packages

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Specification Sections include but are not necessarily limited to:
  1. Section 01 11 00, Summary of Work.
  2. Section 01 32 16, Construction Schedule.
  3. Section 01 33 00, Submittals.
  4. Technical Specifications (Divisions 2 through 43).

### 1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. Definitions
  1. Adjusting. To install or change setting, parameters, calibrations, flows, processes, etc., so that the equipment or system operates in a logical or more efficient state.
  2. Balancing. To make equipment or subsystems operate in harmony or equilibrium by adjusting, altering, or modifying parts of the system.
  3. Functional Testing Meeting: Meeting conducted by the Engineer with Contractor to kick off the Functional Testing of Equipment.
  4. Performance and Systems Integration Testing Meeting: Meeting conducted by the Engineer with Contractor to kick-off the performance and Systems Integration Testing of Equipment.
  5. Commissioning: Commissioning is the series of activities, or processes, necessary to ensure that systems and Equipment are designed, installed, functionally tested, and demonstrated capable of being operated and maintained to perform in conformity with the design intent and Contract Documents. Commissioning includes, but is not limited to factory testing, field testing, dry testing, wet testing, functional and performance testing, systems integration testing, manufacturer's checkout, start-up, and Operational Demonstration.
  6. Commissioning Plan: The document prepared by the Contractor and approved by the Engineer for each Equipment that describes each aspect of the commissioning process including sequences, schedules, responsibilities, documentation requirements, Contractor staffing qualifications, verification procedures, communication structures, etc.
  7. Commissioning Team: Consists of qualified stakeholder representatives that will plan and carry out the overall commissioning process. The individual participants on the Commissioning Team may change as the components being tested and the commissioning requirements change.
  8. Dry Testing: Dry Testing is performed by the Contractor without introducing either process material or other test material into the component, system, or unit process.
  9. Factory Testing: Factory (or Shop) Testing is performance testing, operation testing, or documentation verification conducted in the production facilities, or specialized test facilities, or the Equipment Supplier. Such testing shall conform to the requirements of the individual sections of the Contract Documents. "Witnessed" Factory Testing shall mean that the testing is witnessed by the Owner or designated representative.
  10. Field Testing: Field testing is Functional Testing, Performance Testing, Operational Demonstration, or any other documented verification conducted on the Site after Equipment installation, to provide comparison with the results obtained in the Factory Testing and/or the Contract Document requirements.
  11. Functional Testing (FT): Testing that includes a full range of checks and tests carried out to determine if components, subsystems, systems, and interfaces between systems function in accordance with the design intent, as identified in the Contract Documents. In this context, "function" includes modes and sequences of control and operation,

interlocks and conditional control responses, and specified responses to abnormal emergency conditions.

12. Manufacturer's Check-Out: Field inspection, testing, adjustments, and sign off by the approved representative of the Manufacturer, indicating that the component, system, or unit process meets the manufacturer's requirements.
13. Manufacturer Representative (MR): Factory trained and experienced technician assigned to ensure that components are installed and commissioned in accordance with Contract Documents and manufacturer requirements.
14. Operational Demonstration: A commissioning activity performed by the Contractor wherein the Contractor operates and maintains a fully functional component, system, or unit process for a specified period of time after stable operation has been achieved.
15. Performance Testing: Performance Testing is performed by the Contractor to test components, sub-systems and systems, and system interfaces are individually tested over a specified continuous duration without failure to demonstrate system performance in accordance with the Contract Document requirements.
16. Pre-Commissioning: Pre-commissioning is the systematic demonstration through testing and extended operation that major Equipment and auxiliary systems, including related components, sub-systems, and systems operate properly and consistent with their intended function. Pre-commissioning involves balancing, adjustments, calibration, loop checks, and loop validation. Pre-commissioning shall simulate shutdown conditions, failure conditions, power fail and restart, bypass conditions, and failure resets.
  - a. Pre-commissioning will not be considered complete until successful results and documentation of tests and manufacturer's certifications required by the Contract Documents are submitted and accepted by the Engineer. Pre-commissioning of all portions of the Work shall be successfully completed prior to starting Commissioning.
17. Start-Up: Narrowly defined as placing a component, system, or unit process on-line. Start-Up consists of Pre-functional and Functional Testing to demonstrate the ability of Equipment to operate continuously without vibration, overheating, jamming or leaking. Start-Up shall not start without the participation of the Equipment MR.
18. Systems Integration Testing (SIT): Testing conducted during Performance Testing to ensure that related systems interact seamlessly, verifying each system's ability to operate as expected with other systems within the facility.
19. Wet Testing: Wet Testing is testing performed by the Contractor utilizing test material when possible, in the component, system, or unit process. In lieu of test material, water may be substituted.

#### 1.04 SUBMITTALS

- A. Qualifications of Manufacturer's Representative. Resumes of manufacturer's representatives stating qualifications and experience of individuals proposed for performing facility start-up shall be submitted to the Engineer for review at least 2 weeks prior to the scheduled date for facility start-up. The Owner and/or Engineer/Architect shall have the right to reject the use of an individual for facility start-up.
- B. Pre-Functional Testing Submittals: Prior to the Engineer Functional Testing Meeting the Contractor shall submit and obtain acceptable disposition on the following:
  1. Overall Commissioning Plan and Schedule.



2. Manufacturer's Representative Qualifications.
  3. Manufacturer's Representative Pre-Test Procedures and Checklists.
  4. Contractor's Preliminary O&M Manuals.
  5. Contractor As-Built Documents.
  6. Functional Test Plan (Wet/Dry):
    - a. Physical Checkout by Manufacturer's Representative.
    - b. Functional Test of Equipment Procedure.
    - c. Functional Test Checklists.
    - d. Functional Test Report Forms.
    - e. Functional Test Schedule.
  7. Manufacturer Representative Acceptance Report.
- C. Pre-performance Testing Submittals: Prior to the Engineer Performance Testing Meeting and commencement of Performance Testing the Contractor shall submit and obtain acceptable disposition on the following:
1. Functional Test Report – Results certified by MR and Contractor.
  2. Performance Test Plan:
    - a. Performance Test of Equipment Procedure.
    - b. System Integration Test Procedure.
    - c. Performance Test Checklists.
    - d. Performance Test Report Forms.
    - e. Performance Test Schedule.
  3. Tie-ins and Bypasses Plan(s), if required.
- D. Certificate of calibration for all testing instruments, devices, equipment or materials to be used in the tests.
- E. Functional and Performance Testing Documentation: Contractor shall prepare and submit per Section 01 33 00, "Submittals", all testing documentation required herein for review and acceptance by the Owner and Engineer. The documentation shall include, but not be limited to, the following:
1. Completed test checklists and forms reporting the checks made, testing parameters, and the data collected during tests.
  2. Certification by the Manufacturers' Representative that he/she is the person responsible for the data, and that the data is authentic and accurate.
  3. Certification by the Manufacturers' Representative that the Equipment or systems were tested and performed in compliance with the specified Contract requirements.
  4. Pertinent background information shall include, but not be limited to, the following:
    - a. Equipment or unit process systems commissioned.
    - b. Commissioning dates.
    - c. Items or performance criteria tested clearly showing requirements and field data that verify requirements were met.

- d. Names of witnesses for testing activities.
- e. Any repairs, corrections, or modifications required for the Equipment or unit process systems to successfully complete commissioning.
- f. Loop diagrams accurately depicting the installed condition of instrumentation and controls.
- g. Any other information required by the Specifications such as testing Equipment calibration records, photographs and videos, etc.

5. Appendix:

- a. A summary of all data used in the calculation, including source, formulas with all terms defined.
- b. Calculations for all data submitted, fully defined.
- c. Copies of all raw field data sheets, including those indicating sampling point locations, and notes.
- d. Production and/or operational data.
- e. Calibration procedures and Work sheets for sampling equipment.
- f. Copies of calibration records for instrumentation.
- g. PLC ladder logic documented with comments.

F. Manufacturer's Representative Reports

- 1. The manufacturer's representative shall prepare a daily report on each site visit for each system or item of equipment inspected, adjusted, started up, or worked on. If a manufacturer's representative visits the site for equipment specified in several specification sections, a separate report shall be filed for each specification section.
- 2. The report shall state the purpose of the visit, the representative's observations and conclusions, and recommendations for further visits or action. The manufacturer's representative shall maintain a log of the settings of all adjustable components. Initial settings shall be recorded and submitted on the first visit. During subsequent visits, the manufacturer's representative shall add the current or adjusted setting to the log.

G. Provide the Certificate of Substantial Completion for each piece of equipment and/or system as required by Contract Documents.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS (NOT USED)

2.02 TESTING INSTRUMENTATION

- A. All instruments, devices, equipment, or materials used in testing by the Manufacturer Representative or Contractor shall be calibrated, and documentation of such calibration shall be included in pre-test and post-test submittals to the Engineer.
- B. The Contractor shall supply all materials and equipment used in testing, adjusting, and balancing. This includes, but not limited to, valves, gauges, piping, test equipment and other materials and equipment required to conduct testing.
- C. Materials and equipment used shall be of good quality and suitable for the intended service. The use of miscellaneous items found at the job site is not acceptable.

- D. Select range or capacity of test equipment to provide meaningful results. Select pressure or differential gauges to that test pressures I 50 percent to 75 percent of maximum gauge reading.

### **PART 3 - EXECUTION**

#### **3.01 DELIVERY, STORAGE, AND HANDLING**

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

#### **3.02 MANUFACTURER REPRESENTATIVE**

- A. Reports of the Approved Manufacturer Representative:
  - 1. The manufacturer's representative shall prepare a daily report on each site visit for each system or item of equipment inspected, adjusted, started up, or worked on. If a manufacturer's representative visits the site for equipment specified in several specification sections, a separate report shall be filed for each specification section.
  - 2. The report shall state the purpose of the visit, the representative's observations and conclusions, and recommendations for further visits or action. The manufacturer's representative shall maintain a log of the settings of all adjustable components. Initial settings shall be recorded and submitted on the first visit. During subsequent visits, the manufacturer's representative shall add the current or adjusted setting to the log.
  - 3. The reports shall be submitted in accordance with Section 01 33 00, "Submittals", within three (3) days of each visit.

#### **3.03 PREPARATION**

- A. Contractor shall verify that all copies of the Preliminary Maintenance and Operating Manuals have received, from the Engineer, an acceptable disposition as defined in Section 01 33 00, "Submittals", and the only outstanding item is the field verification of the Manuals.
- B. Equipment Adjustments. Make all adjustments, corrections, and calibrations to set points, process parameters, etc., necessary to achieve normal, stable operation of systems.
- C. Prior to beginning a start-up, Contractor to inspect the systems and equipment to verify their readiness to begin with the manufacturer's representative.
  - 1. Correct hazardous conditions to equipment or personnel prior to start-up of equipment.
  - 2. Do not proceed with start-up operations using temporary power or temporary instrumentation and control wiring unless approved. All electrical and control connections shall be permanent and complete, and all such electrical components and equipment fully functional.
  - 3. Design, fabricate, and install all necessary testing and monitoring equipment before commencing the test.
    - a. Quality. Use materials and equipment of good quality and suitable for the intended service. The use of miscellaneous items found at the job site is not acceptable.
    - b. Maximum Gauge Readings. Select capacity or range of test equipment to provide meaningful test results. Select pressure or differential pressure gauges so that test pressure is 50 percent to 75 percent of maximum gauge reading.

- c. Temporary Equipment. Fabricate, as necessary, any temporary equipment used in testing. This equipment shall remain the property of the Contractor who will remove it from the site upon substantial completion.
    - d. Use of spare parts during Start-Up operations shall not be permitted, except in such situations where the actual on-Site verification of such repair parts' operability is specified. Contractor shall provide or have access to its own spare parts required for testing.
  - 4. When feasible, process flows and solids shall be used for commissioning the Equipment and unit process systems to show the Equipment and unit process systems function properly. Commissioning shall confirm the proper operation of the Equipment and unit process systems with process fluids and process solids, adjustments shall be made, and the Equipment or unit process systems shall be optimized and brought into compliance with design criteria in preparation for Operational Demonstration (if specified).
  - 5. Manufacturer's representative(s) shall be present for the initial start-up of all systems or equipment.
  - 6. Installation Checks. Normal installation checks, such as for rotation, are not considered start ups and do not require start up notification. All electrical apparatus which is energized shall be clearly marked.
- D. Request permission to start up equipment, including electrical gear, and notify the Engineer/Architect of the start-up.
  - 1. Submit the start-up request a minimum of 72 hours before the scheduled start-up. Make requests in writing during normal working hours.
  - 2. Start-up request shall be in accordance with Section 01 33 00, "Submittals."
  - 3. The Owner and/or Engineer shall have the right to reject the use of an individual for facility start-up.
  - 4. Approval of the request is based solely on impact on plant operations. Approval does not relieve the Contractor of any responsibility for plant and personnel safety.
  - 5. Coordinate the start-up of each piece of equipment with the Owner and the Engineer so that operation does not interfere with the normal operation of the facility.
- E. Engineer Testing Meetings: During the commissioning period, the Engineer will conduct meetings as required to coordinate the Testing and Commissioning process. The content of these meetings shall include:
  - 1. Status of the Commissioning Plan and Schedule.
  - 2. Status of outstanding submittals required prior to each stage of testing as described herein.
  - 3. Commissioning related issues and actions to be taken.
  - 4. Amendments to the accepted Commissioning Plan and Schedule.
  - 5. Tie-ins and Bypasses Plan(s), if required, including sequencing and schedule, emergency action plan, safety/health/environmental plan, incident plans, and contingency plan(s).
- F. Planning and Coordination of Activities with Engineer: Contractor shall coordinate all Testing and Commissioning activities for Equipment and unit process. The Contractor shall develop a detailed Testing and Commissioning plan that includes the following as a minimum:

1. Description of the overall, general Testing and Commissioning process.
  2. List of Equipment and unit process systems included for Testing and Commissioning activities.
  3. Detailed Testing and Commissioning sequence of activities.
  4. Listing of Contractor staff and responsibilities for activities.
- G. Prior to commencement, all necessary testing equipment shall be in place and operable.
- H. All Equipment and electrical apparatus which are energized shall be clearly marked.

### 3.04 COMMISSIONING

- A. Commissioning includes, but is not limited to factory testing, field testing, dry testing, wet testing, functional and performance testing, systems integration testing, manufacturer's checkout, start-up, and Operational Demonstration.
- B. Equipment Failure. Consider any failures of equipment or systems as deficiencies and correct them. Stop testing and the start-up until all deficiencies have been corrected.
- A. Testing:
1. All initial testing of Equipment or systems shall be performed under the technical direction of the approved representative of the manufacturer.
  2. Contractor shall repair, replace or modify any Equipment or system which fails to perform as specified in the Contract Documents. Such repair, replacement or modification of deficient Work shall be performed by Contractor without any additional compensation unless approved by the Owner.
- B. Contractor shall be responsible for testing and commissioning all Work. Acceptance shall be by the Engineer subject to approval of the Owner.
- C. Contractor is responsible for the performance and operation of the systems and Equipment during commissioning.
- D. When Owner personnel are operating systems or Equipment, the Contractor shall make available, at all times, persons knowledgeable about the systems or Equipment, to direct the Owner personnel in its operation.
- E. Contractor shall make all adjustments and corrections necessary to achieve normal, stable operation of systems. While Equipment and systems are operational prior to Substantial Completion, the Contractor shall have support staff available to the Owner on a twenty-four (24) hour per day, seven (7) day per week basis to address maintenance, repair or adjustment issues when called upon by the Owner or Engineer.
- F. Any failures of Equipment or systems operated under the direction of the Contractor shall be considered deficiencies and shall be corrected in accordance with the Contract Documents at no additional cost to the Owner.

### 3.05 DRY TESTING

- A. All equipment and systems shall be tested, adjusted, aligned, lubricated, and balanced in accordance with the manufacturer's instructions prior to testing.
- B. Test individual components prior to testing the system of which they are a part.

### 3.06 WET TESTING

- A. Test all Equipment and systems with a test material, such as potable water, rain water or river water. If river water is available, Contractor shall submit a State of Ohio, Temporary

Water Withdrawal Facility Registration Form, with the Ohio Department of Natural Resources, Columbus, Ohio. Potable water shall be used to test potable water lines.

1. All costs, including materials and Equipment, for delivery of the test material shall be at the Contractor's expense. Test each component or item of Equipment to demonstrate compliance with the design criteria or range of criteria.
- B. After testing, adjusting, and balancing, test all Equipment and systems for a minimum of seventy-two (72) hours under the design operating conditions utilizing test material.
- C. Suspend or secure all tests in the event of test failures, or if hazardous conditions occur. Make repairs, replacements, or adjustments and re-start test in its entirety at no additional cost to the Owner.
- D. Contractor shall be responsible for disposal of the test material in a manner acceptable by the Engineer at no additional cost to the Owner.
- E. Contractor shall clean all Equipment systems and structures upon conclusion of testing, unless otherwise directed by the Engineer, at no additional cost to the Owner.

### 3.07 SYSTEM FAILURE

- A. When there appears to be a system failure and the system is composed of separate but functionally codependent individual pieces of equipment and check-out of each piece of equipment by its respective manufacturer's representative verifies that the equipment is functioning properly, then the Contractor's remains responsible for overall system operation.
- B. Verify compatibility of equipment during the submittal process to minimize overall system operating problems.
- C. Reconfigure, repair, modify, or replace parts or all the equipment in order to provide a system that shall perform as specified at no additional cost to the Owner.

### 3.08 HIGH SERVICE PUMP 3, VFD, AND FLOW CONTROL VALVE PERFORMANCE TESTING

- A. Field testing shall be performed in accordance with the construction sequencing and constraint requirements of the project and CONTRACTOR shall notify the Owner in advance of said testing, in accordance with the requirements of Division 01. Submit a field test procedure with proposed instrumentation for approval at least 30 days before the scheduled test date and CONTRACTOR shall provide the City with the test date two weeks prior to said test date.
- B. Testing shall be sufficient to demonstrate successful operation of the new motor, VFD, flow control valve, and electrical power supply and control systems.
- C. Pumps, motors and electrical power and control system operation shall be demonstrated with the pump and motor uncoupled. Demonstration shall include, but not be limited to, functional testing of control system switches, relays, alarms and displays.
- D. Field testing shall verify proper alignment of the pump and motor control and alarm functions.
- E. Field testing of High Service Pump 3 shall include flow, suction and discharge pressure, process flow temperature, pump speed and pump vibration as described herein. Contractor shall clean and check lubrication of all parts in preparation for field testing and the grade of lubricant shall be in accordance to the manufacturer's standards.
- F. Pump capacity versus TDH shall be developed for High Service Pump 3 at various pump operating speeds to cover the full operating range of the VFD. During the testing, record the current and voltage readings taken from the motor and bearing temperatures.

1. Develop a pump curve of head versus flow as specified herein and obtain at least six points on the pump curve for each operating speed to cover the full range of the VFD (four curves to cover various speeds through the range of 800 to 1,200 RPM).
  2. Record and provide current readings to be used to determine pump brake horsepower at each operating point.
  3. After starting the test, 10 minutes shall be given before readings commence. The pumps shall continue to run for a minimum of 48 consecutive hours within which bearings temperatures shall stabilize within the first hour. At the conclusion of this test, all the readings shall be taken again and shall demonstrate stability. Record bearing temperatures during testing.
- G. Provide temporary testing instrumentation as required. Devices shall be used in conjunction with installed permanent instrumentation, to provide independent verification of operating conditions as required by the Engineer and Owner.
1. Instrumentation shall include, but not be limited to, pressure gauges, ammeters, and temperature monitoring devices.
- H. Successful operation shall be defined as demonstrating the pumping unit operates at or within the range of the specified operating parameters and is controlled in the manner described herein and Contract Documents.
- I. Vibration testing shall be successfully completed during this period as described herein and testing shall demonstrate harmful vibrations are not present.

### 3.09 OPERATIONAL DEMONSTRATION

- A. Operational Demonstration Preparation. Prior to the operational demonstration beginning:
1. Complete start-up procedures including submitting all reports for all parts of the work designated for the operational demonstration.
  2. Complete all required construction activities, including any activities by any entity that would interrupt the normal operations of the demonstration.
  3. Ensure that adequate parts and supplies for routine maintenance and replacement are on hand to support system operation through the demonstration period.
  4. Deliver all repair parts to the Owner.
  5. Submit an operational demonstration request according to Section 01 33 00, "Submittals," 48 hours prior to start of operational demonstration.
- B. Contractor shall perform an operational demonstration of the Work prior to acceptance
1. Equipment and Systems shall include, but not be limited to the following:

<b>Project System</b>	<b>Equipment</b>	<b>Minimum Operational Demonstration Duration</b>
Operation of High Service Pump 3 with VFD and new motor	High Service Pump 3 on VFD	2 weeks
Operation of flow control valve	Flow Control Valve	1 week
SCADA Addition	SCADA	1 week

2. Operational demonstration of the Equipment and/or systems shall be successful operation be coordinated with Engineer. Contractor shall be responsible to provide all chemicals, if required, for completion of the Operations Demonstration.
  3. Operational demonstration of the modified Systems Integration Plan operated under the “Emergency Operation Condition” shall be the successful operation of the system for a total of no less than two (2) times.
  4. With approval, individual systems may be independently demonstrated as long as their complete range of operation and performance can be shown without the rest of the facility.
  5. Maintenance. Perform all required maintenance and servicing during the operational demonstration at the specified intervals and as necessary. Note all maintenance and servicing in the operational demonstration log.
- C. During the Operational Demonstration and when required by the individual Project Specification Sections, the Contractor and the Manufacturer's Representative shall conduct the performance tests.
- D. During the operational demonstration, the Owner may require or permit the operational demonstration to be suspended:
1. Upon the written request of the Contractor, to correct or adjust the Work, when in the judgment of the Owner or Owner's Representative such required correction or adjustment is insufficient to deem the operational demonstration to have failed.
  2. If the operational demonstration is suspended for any reason except failure, operational demonstration time shall accrue to the Work from the time of the beginning of the operational demonstration to the time of the suspension.
  3. If the operational demonstration is suspended at the request of the Contractor, the Contractor shall continue operation and maintenance of the Work without additional charges to the Owner, according to all provisions of this section of the specifications, and to the extent required by the Owner. No operational demonstration time shall accrue to the Work during the period of suspension.
- E. Time
1. Have sufficient personnel available during the entire demonstration to ensure proper maintenance, adjusting, troubleshooting, and any and all repairs to equipment, controls, etc., to maintain and keep the entire facility operating continuously over the Operational Demonstration duration specified.
  1. Operational Demonstration of system and equipment the Owner personnel, under the direction of the Contractor will assume operation of equipment.
    - a. The Owner remains in control of the plant processes. Contractor shall provide technical direction in the operation of equipment and systems.
    - b. All equipment and systems shall remain totally operational during this period.
    - c. Upon successful completion of the operational demonstration, the work is considered to be ready for its intended use, and the Contractor may make recommendation for substantial completion.
  2. Outages
    - a. Note all outages of equipment, system(s), or the plant in the operational demonstration log.



- b. Facility power outages such as power failure, process failure or existing equipment, and planned outages of existing systems for cleaning, maintenance, or repair are considered a part of normal plant operation and will not invalidate the operational demonstration.
    - c. Be responsible for the safe and orderly shutdown and restart of equipment as necessary in the event of an outage.
    - d. Do not include outage time in the demonstration time period.
  - 3. Do not count activities such as filling, draining, purging, heating or cooling to temperature, stabilizing, adjusting, testing, or other start-up activity time as operational demonstration time.
  - 4. Failed Operational Demonstration
    - a. If, during the operational demonstration, any part of the Work fails to fully conform to the requirements of the Contract Documents, the operational demonstration shall be considered to have failed and the Work shall not be considered to be substantially complete, and the Engineer shall so notify the Contractor in writing.
    - b. Upon failure of the operational demonstration, promptly remedy any defects in the work and promptly reschedule and restart the complete operational demonstration time period. No operational demonstration time will be considered to have accrued to any part of the work by reason of a failed operational demonstration.
  - 5. Suspension of Operational Demonstration
    - a. During the operational demonstration, the Owner may require or permit the operational demonstration to be suspended upon the written request of the Contractor to correct or adjust the work, when in the judgement of the Owner or Owner's Representative such required correction or adjustment is insufficient to deem the operational demonstration to have failed.
    - b. If an operational demonstration is suspended for any reason except failure, operational demonstration time shall accrue to the work from the time of the beginning of the operational demonstration to the time of the suspension. No operational demonstration time shall accrue during the period of suspension.
    - c. If an operational demonstration is suspended at the request of the Contractor, continue operation and maintenance of the work without additional charges to the Owner, according to all provisions of this section of the specifications, and to the extent required by the Owner.
- F. Operational Demonstration Reporting:
- 1. Daily – Copy of the Operational Demonstration logs shall be submitted to the Engineer or Owner the following day.
  - 2. Within two (2) weeks of the termination or completion of the Operational Demonstration, the Contractor shall submit for approval: 1) Changes to Maintenance and Operation Instructions; 2) A report of the Operational Demonstration, describing the equipment utilized and any repairs, modifications, adjustments, or other Work performed during the demonstration period.
  - 3. In the event the conduct of the Operational Demonstration or the submittals is unacceptable to the Engineer, the Contractor shall perform the additional Work or demonstrations until acceptable at no additional cost to the Owner.

4. O&M Manuals. Start-up and operation of the system and all associated equipment shall be in accordance with the O&M manuals. If deviations from the manuals are necessary, note these in the operational demonstration log, and subsequently submit as revisions to the O&M manuals.

G. Completion of Operational Demonstration

1. Startup and operation of the system and all associated equipment shall be in accordance with the Initial Maintenance and Operating Instructions. If deviations from these instructions are necessary, these shall be noted in the operational demonstration log, and subsequently submitted as revisions to the Maintenance and Operating Instructions per Section 01 33 00, "Submittals". During the period of time between the completion of the Operational Demonstration and the Date of Substantial Completion, the system and equipment will be operated and maintained under the requirements of the Operational Demonstration. The Owner will not assume full responsibility for operation and maintenance of the system and equipment until all conditions for Substantial Completion have been satisfied and both the Contractor and Owner have accepted the Certificate of Substantial Completion.
2. The Owner will not assume full responsibility for operation and maintenance of the system and equipment until successful completion of the operational demonstration and all conditions for substantial completion have been satisfied and both the Contractor and Owner have accepted the Certificate of Substantial Completion.
3. Contractor shall attend operational coordination meetings as called by either the Owner or Engineer to review operating conditions of equipment and systems.
4. Completion of the operational demonstration does not relieve the Contractor of its other requirements for substantial completion as required by the Contract Documents.

END OF SECTION

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**SECTION 01 78 23**  
**MAINTENANCE AND OPERATING INSTRUCTIONS**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

A. Scope of Work

1. Provide operation and maintenance data in the form of paper and electronic instructional manuals for use by the Owner's personnel for all equipment, systems, instruments and devices provided under this Project. The operation and maintenance data submitted shall comply with this section and other Contract Documents.
2. The Contractor shall prepare and furnish Maintenance and Operating Instructions for installation, maintenance, and operation of all equipment and associated subsystems and systems as specifically required in Divisions 2 through 43.

B. Definitions

1. The term "operating and maintenance data" includes all product rated information and documents which are required for operation of the system operation and maintenance manual. It also includes all data that must accompany the manual as directed by current regulations of any participating governmental agency.
2. The term "preventative maintenance" includes all information and instructions required to keep a product or piece of equipment properly lubricated, adjusted and maintained so that the item/equipment functions economically throughout its entire design life.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. The Contractor shall initially submit one (1) electronic copy of the maintenance and operating instructions for review. After approval of the review copy, four (4) copies of the revised instructions shall then be submitted to the Owner in addition to the final electronic.
1. Each printed copy shall be bound in an appropriately sized three ring notebooks with a cover designating the name of equipment, maintenance, and specification section number. Maintenance and operating instructions for each specification section shall be bound in a separate notebook. Six copies of any revisions shall be submitted for insertion in the notebooks.
  2. Manual shall provide information specified herein for Operational and Maintenance Data and Preventative Maintenance Data.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

3.02 GENERAL REQUIREMENTS

- A. Maintenance and Operating Instructions shall include all of the following:
1. Manufacturer's Data. Include general descriptive bulletins, brochures, or catalog sheets used to describe the equipment.
  2. Operating Instructions/Operating Sequence Descriptions. These shall be complete, detailed written descriptions of the operating sequence of all control systems and operations in all modes. The descriptions shall be specifically prepared for this work and shall be fully referenced to control diagrams and system components. The descriptions shall include start-up and shutdown operations under manual, system safety functions.
  3. Manufacturer's Instructions. This shall include instructions for storage, installation, routine preventive maintenance, and lubrication. This data shall include instructions that describe the proper procedures for moving, supporting, and anchoring of equipment, including tolerances for settings and adjustment. Also included shall be the storage requirements and procedures to protect products prior to installation, and once installed, prior to start-up/periods of prolonged shutdown, and proper storage of repair parts.
  4. Parts List. Include assembly, exploded view illustrations, or sectional drawings with all parts identified. Part listings shall include descriptions, quantity (per assembly) required, and original equipment manufacturer's part numbers.
  5. Supplier Data. Provide addresses, telephone numbers, and names of contact persons for the equipment manufacturer and manufacturer's representative. Include both regional (local) and home offices.
  6. Warranties and Guarantees. Include terms and conditions of the warranty. Include the manufacturer's express warranty and any special express warranties as specified in individual sections of Divisions 2 through 46 of the Project Manual in addition to the general warranty. Draft warranties shall be submitted with the shop drawing submittals. Final warranties will become effective on the date of substantial completion applicable to the named equipment. Copies of the approved draft warranties are to be included in the initial Maintenance and Operating Instructions submittal. Following substantial completion, copies of the executed final warranties shall be provided for insertion into the final Maintenance and Operating Instructions.
  7. Approved Submittals. Provide a complete list (including submittal numbers) of all approved submittals pertaining to the Maintenance and Operating Instructions.
  8. Copies of all materials shipped with the equipment.
  9. Copies of all approval submittals including control wiring diagrams.

### 3.03 DEPOT LEVEL INSTRUCTIONS

- A. Individual sections of Divisions 2 through 46 of the Project Manual require that Depot Level information be submitted as part of the initial Maintenance and Operating Instructions. Depot level instructions are detailed instructions that would be used by the manufacturer's factory, repair depot, or authorized service center to repair or rebuild an item of equipment or a component, part, or subassembly of an item of equipment deemed by the manufacturer as "not user serviceable." These instructions will be used for both ordinary and major maintenance, and enable the Owner to overhaul or repair equipment in the event parts become unavailable.
- B. The following is a list of Operational and Maintenance Data and Preventative Maintenance depot level instructions that are specifically required by individual sections:
1. Detailed Parts Lists. In addition to original equipment manufacturer's parts numbers, provide complete part descriptions, sizes, and materials of construction types and/or grades using appropriate industry standard designation codes. Provide universal part numbers for applicable items such as bearings, seals, and gaskets.
  2. Repair Data. Include instructions for assembly, disassembly, rebuilding, and repair of the equipment or component.
  3. Manufacturing Data. Scale drawings and supplementary information with complete dimensions, tolerances, finishes, features, materials, and treatments required for procurement of materials and manufacture of the part(s) or equipment.
  4. Electrical Diagrams. Schematic diagrams, wiring diagrams, point-to-point wiring diagrams, and logic flow diagrams.
  5. Mechanical Diagrams. Schematic diagrams of pneumatic, hydraulic, and other mechanical systems and piping.
  6. Troubleshooting Data. Include procedures, forms, or checklists, outlines, and diagnostic aids and information.
  7. Test Data. Include procedures, readings, and settings for testing and calibration.
  8. Repair Parts and Maintenance Materials. List replacement parts, special tools, and consumable materials used in cleaning, maintenance, and repair.
  9. Software/Programming Documentation. This documentation shall be referenced to the Operating Sequence Descriptions and shall include flow charts, program source code listings, and documentation ladder diagrams with detailed descriptions for each rung for the software provided. Information shall be provided to instruct and to familiarize the operator and shall be reviewed with the system programming to enable a step-by-step evaluation of the program. Notations, remarks, and labeling shall be provided on the program source code listing to indicate the program operation and function. Any additional narrative description of the program operation shall be provided to fully describe the system parameters and functionality in a clear and logical manner.
  10. Preventative maintenance instructions shall include, but not limited, a written explanation with illustrations for each preventive maintenance task, recommended schedule for execution of preventative maintenance tasks, lubrication charts and table of alternative lubricants, and list of required maintenance tools and equipment.

### 3.04 OTHER INSTRUCTIONS

- A. Submit additional information as required by individual sections of Divisions 2 through 46 the specifications.

### 3.05 VERIFICATION

#### A. General

1. The Contractor shall verify the accuracy of Maintenance and Operation Instructions by visual and physical inspection of the installed equipment. The Contractor shall:
  - a. Perform field verification in the presence of the Owner or Owner's Representative.
  - b. Notify Engineers two (2) weeks before the scheduled field verification. The Engineer may require changes in the field verification schedule.
  - c. Physically trace and document as required all wiring and piping.
  - d. Visually inspect equipment and components and compare configurations and nameplate information to Maintenance and Operating Instructions.
  - e. Submit any changes, additions, or deletions to the Maintenance and Operating Instructions identified during field verification.
  - f. In the event changes are made to the equipment following field verification, the Contractor shall submit a final supplement of approved revisions of the Maintenance and Operating Instructions.

### 3.06 SHIPPED INSTRUCTIONS

- A. Within three (3) weeks of equipment delivery, submit copies of maintenance, operation, and installation instructions shipped with the equipment.

## **PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

**SECTION 01 78 39**  
**PROJECT RECORD DOCUMENTS**

**PART 1 - GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. Conformed to Contract Drawings. Drawings provided to the Contractor prior to the beginning of construction and includes modifications as indicated on addendums to the Bid Documents originally issued during the bidding process. Contractor shall verify accuracy of the Conformed to Contract Drawings prior to beginning construction activities.
- B. Record Drawings. The version of the Conformed to Contract Drawings that are marked up by the Contractor that indicated all actual installed assets and equipment or modifications of such, to fully describe the constructed product and accounting for all variances from the original Conformed to Contract Drawings. Record Drawings are required to show changes clearly shown on the Conformed to Contract Drawings and not include shop drawings attached.
- C. Record Documents. The Record Drawings and supporting documentation (such as shop drawings, instrumentation data sheets, I/O list, any document, diagram or file, and all supplementary information needed to fully define all work performed and installed related to the project
- D. Scope of Work
  - 1. Keep all Project Record Documents updated to record construction as actually built and to document all approved changes to the documents as described herein and Contract Documents.

**1.02 RELATED DOCUMENTS**

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

**1.03 QUALITY ASSURANCE**

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

**1.04 SUBMITTALS**

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Upon Substantial Completion, Contractor shall provide a PDF set of the complete records along with any AutoCAD files for details and supplemental drawings created by the Contractor. Final payment will not be made until Record Drawings, document and all supporting ancillary records are received and accepted by the Owner. The Contractor shall answer any questions or perform edits as required by the Owner based on this submittal and remain available to perform these tasks.
- C. Project Record Documents
  - 1. The Contractor shall submit project record documents, as follows:
    - a. The Contractor shall submit one set of the Contract Drawings with each sheet labeled "Project Record" and updated as specified.



- b. The Contractor shall submit one copy of other contract documents with the cover labeled "Project Record" and updated as specified.
- c. The Contractor shall submit one copy of each Record Shop Drawing with each sheet labeled "Project Record" and updated as specified.
- d. These requirements for Record Project Documents are in addition to the requirements for the Maintenance and Operating Instructions.
- e. Signature of the Contractor affirming submittal.

#### 1.05 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### 3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

#### 3.02 EXAMINATION AND VERIFICATION

- A. Maintain in Contractor's field office in clean, dry, legible condition the following: contract drawings, specifications, conforming shop drawings, contract modifications, other modifications of contract, test records, survey data, and all other documents pertinent to Contractor's work.
- B. Provide files and racks for proper storage and easy access. File in accordance with filing format acceptable to Engineer/Architect.
- C. Make documents available at all times for inspection by Engineer/Architect.
- D. Project Record Documents shall not be used for any other purpose and shall not be removed without Engineer approval.

#### 3.03 EXECUTION

- A. Do not permanently conceal any work until required information has been recorded and Engineer has been given sufficient time to inspect all work.
- B. Update Record Documents as Construction Proceeds
  - 1. Keep all Project Record Documents updated to record construction as actually built and to document all approved changes to the documents. This update information shall include but is not necessarily limited to the following:
    - a. Contract Drawings. Legibly mark to record actual construction including:
      - 1) Depths of various elements of foundation in relation to datum.
      - 2) Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
      - 3) Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
      - 4) Field changes of dimension and detail.
      - 5) Changes made by Change Order or Work Order.

- 6) Add details no on original Conformed to Contract Documents to explain or clarify work. Use consistent symbols to the documents and track all changes.
- b. Specifications. Legibly mark up each section to record
    - 1) Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually incorporated into the work.
    - 2) Changes made by Change Order or Work Order.
  - c. Submittals. Prepare and submit one copy of all submittals for the work performed under this Contract. These submittals shall be updated as outlined above. Submittals shall be in legal files with the specification section and title marked on the tab.

**PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

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**SECTION 01 79 00**  
**DEMONSTRATION AND TRAINING**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

- A. This Section includes preparation of the Contractor's Training Plan, Instructor Qualifications, and the conduct of Owner staff training. Training shall be conducted on all components of Equipment, as specified in individual applicable sections of the Contract Documents
  - 1. Contractor to provide services of a factory-trained maintenance personnel to instruct the Owner's Operational and Maintenance personnel in the recommended operation and preventative maintenance procedures for equipment provided under this project. Qualifications of the specialist shall require approval from the Engineer.
- B. Training shall include a combination of a classroom session and field training with a maximum class size of 10 trainees. Training shall be performed for all shifts at the facility, as required, and may require to be conducted outside normal business hours to accommodate schedules of the Owner's personnel.
- C. A Preliminary Operations & Maintenance Instruction Manual for the Equipment, which shall have received an acceptable disposition, shall be utilized by the training instructor.
- D. All Instruction of Owner Personnel required by the Contract Documents must be submitted and receive an acceptable disposition by the Engineer prior to issuance of the Certificate of Substantial Completion.
- E. Coordination
  - 1. Coordinate instruction schedule with Owner and Engineer. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
  - 2. Coordinate Instructors, including providing notification of dates, times, length of instruction time, and course content. Coordinate videographers for attendance at minimum of one session for repeated content sessions.
  - 3. Coordinate content of training modules with content of accepted emergency, operation and maintenance manuals. Do not submit instruction program(s) for review until the operation and maintenance data required under Section 01 78 23, "Operation and Maintenance Manuals", has been reviewed and accepted by Engineer.

**1.02 RELATED SECTIONS**

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

**1.03 QUALITY ASSURANCE**

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

**1.04 SUBMITTALS**

- A. At least ten (10) copies of instructional materials used for training shall be provided at time of the first training session. Quantity to be verified prior to training.

- B. Provide two (2) copies of all audio/visual aids utilized during training including films, slides, mock-ups, videotapes, USB thumb drives, or other training aids. All multimedia video shall be submitted in either Audio Video Interleave (AVI) format or Moving Pictures Expert Group (MPEG) format on 3.0 USB thumb drives.
- C. Proposed Training Schedule: For the entire Project showing tentative dates for each training session as specified in the applicable sections of the Technical Specifications (Divisions 2 through 43); include number, type and duration of each session. This schedule shall be submitted at least one-hundred twenty (120) days prior to commencement of any individual training being performed. Schedule shall be refined and updated with input from affected parties within sixty (60) and thirty (30) days of scheduled training.
- D. Instructor Qualifications: Submit resumes, including three (3) outside references, for each Instructor proposed for training program. The qualifications of each Instructor shall include:
  - 1. Type of training Instructor has received for the specific Equipment the training module will cover, including dates and who provided the training.
  - 2. Training Work experience including the employer's name, address, and dates of employment and type of training provided, and to whom.
  - 3. Specific details of Instructor's experience pertaining to operation and maintenance of, and training for, the Equipment or system specified.
  - 4. A minimum of three (3) training references including: project name, project location, contact person's name, contact person's telephone number, contact person's role during the project, dates of training, and type of training provided.
  - 5. Engineer will review resumes. Based upon review of resumes, and contacts with references, Engineer will approve, request additional information, or reject proposed Instructors for training program.
    - a. If proposed Instructor is rejected, Contractor shall submit resume and references on alternate Instructor for acceptance.
  - 6. Qualifications shall be submitted at least sixty (60) days prior to commencement of any training.
- E. Contractor's Training Program: shall be submitted at least sixty (60) days prior to commencement of any training. Along with the items listed above the plan shall also include:
  - 1. A title page containing: Title of the Lesson Plan, product name and model of Equipment; name of manufacturer, manufacturer address and phone number; name and phone number of manufacturer's contact; job location – Akron, Ohio – (Name of Facility); Contract No.; specification number; Contractor name, address and phone number; Subcontractor name, address, phone – if applicable; submittal number assigned by Contractor; and submittal date.
  - 2. A table of contents
  - 3. A detailed instructional objective statement on the goal(s) intended to be achieved by the end of the training session.
  - 4. A list of all training materials to be used, including the Preliminary Operations & Maintenance Instruction Manual, which shall have an acceptable disposition.
  - 5. A request of schedule dates and training attendees and times for each training session. Engineer to coordinate this between Contractor and Owner.

- F. After the Lesson Plan submittal has received an acceptable disposition but at least three (3) weeks prior to actual commencement of training, Contractor shall submit the training material as a PowerPoint presentation in an electronic format (DVD, CDR, or flash drive/micro storage) with appropriate labeling.
  - 1. In addition to the electronic format, the PowerPoint material shall be provided in hardcopy for Engineer review and approval.
  - 2. The text and lettering on the presentation slides shall not be smaller than 12 font size and shall be black in color.
  - 3. Slides shall have an appropriate light-colored background, resulting in a high contrast between the text and background.
- G. Provide Audio-Video recording of each training session.
- H. Submit course materials and Contact Hour Course applications to Ohio EPA to gain approval for each training session.
  - 1. (<https://epa.ohio.gov/divisions-and-offices/drinking-and-ground-waters/certified-operators/training-provider>)

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, AND HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

3.02 EXAMINATION AND VERIFICATION OF CONDITIONS

- A. The training site for the classroom instruction shall be arranged by the Contractor and coordinated with the Owner. The Contractor shall coordinate and verify to ensure the following prior to the scheduled training time(s):
  - 1. All associated construction required to operate the Equipment in all normal and anticipated operating modes is complete.
  - 2. The Equipment area is well lit and unobstructed, so that all training class attendees may access, hear, and view the training. Also, videographer if required.
  - 3. The Equipment area is free of construction activities that could present a hazard to training class participants.
  - 4. Adequate training material, as required by this Section, is on hand for use during the training session.
  - 5. Any representatives of interfacing Equipment manufacturers needed to perform supporting operations allowing demonstration of Equipment operation have been notified and will be available.
- B. Training session shall have received OEPA Contact Hour Course Certification prior to providing training.

### 3.03 PREPARATION

- A. Videotaping of all training shall be conducted by the Contractor. Before starting training the Contractor and the Owner shall review the training site(s) to establish acceptable sight lines, lighting and locations for the participants.
- B. Training classes shall be conducted and separated for the following personnel if requested by the Owner and Engineer:
  - 1. Maintenance personnel
  - 2. Operations personnel
  - 3. Systems and/or electrical personnel
  - 4. Provide audio/visual equipment and training aids as needed.
- C. Classroom and field instruction shall be provided for each group. Field instruction will include attention to applied familiarization with the actual Equipment. Training hours as required in the Contract Documents do not include travel, set-up or cleanup time by the Instructor.
- D. For field training, the Instructor shall demonstrate all operations of the Equipment and may be required to show assembly and disassembly procedures, maintenance procedures, replacement procedures, etc. Field training will occur at the installed location of the Equipment or material unless mock-ups are approved in the Lesson Plan and provided by the Contractor. Such mock-ups will become property of the Owner after the training sessions unless previously requested in the Training Plan and accepted by Engineer.
- E. Systems Training: The Engineer will provide a detailed description of the system design, intended operation, and interactions of systems components. The Contractor's portion of Systems Training will provide additional detail descriptions of the system's components and their interface with each other and other systems. Contractor's personnel for Systems Training shall be the same personnel who provided training described herein.

### 3.04 TRAINING OUTLINE

- A. Training outline shall indicate the category of training (maintenance and operation, electrical, process, mechanical, and instrumentation or system); description of the session; length, and type (classroom or field). The training shall include as a minimum:
  - 1. System (Equipment) Overview:
    - a. Describe system (Equipment) fundamental operating principals and dynamics.
    - b. Identify system's (Equipment's) mechanical, electrical and instrumentation components and features. Review system (Equipment) wiring diagrams and process and instrumentation diagrams.
    - c. Identify support systems (Equipment) associated with the operation (e.g., air intake filters, valve actuators, motors).
    - d. Identify and describe safety precautions and potential hazards related to maintenance.
    - e. Identify and describe in detail safety and control interlocks.
    - f. Identify and describe alarm conditions and response to alarms.
    - g. Cover the supply of power to process Equipment and related appurtenances, lighting, etc.
    - h. Cover low voltage controls, monitoring devices, etc.

2. Equipment Preventive Maintenance (PM):
  - a. Describe PM inspection procedures required to perform an inspection of the Equipment in operation, spot potential trouble symptoms, and anticipate breakdowns and forecast maintenance requirements (predictive maintenance).
  - b. Define the recommended PM intervals for each component.
  - c. Provide lubricant and replacement part recommendations and limitations.
  - d. Describe appropriate cleaning practices and recommend intervals.
  - e. Identify and describe the use of special tools required for maintenance of the Equipment.
  - f. Describe component removal and installation, and disassembly and assembly procedures.
  - g. Perform at least two (2) "field" demonstrations of preventive maintenance procedures.
  - h. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
  - i. Define recommended torque settings, mounting, calibration and alignment procedures and settings, as appropriate.
  - j. Describe recommended procedures to check or test Equipment following a corrective repair.
3. Equipment Troubleshooting:
  - a. Define recommended systematic troubleshooting procedures.
  - b. Provide component specific troubleshooting checklists.
  - c. Describe applicable Equipment testing and diagnostic procedures to facilitate troubleshooting.
4. Maintenance and Operation Training: Overview:
  - a. Describe system (Equipment) operating (process) function and performance objectives.
  - b. Describe system (Equipment) fundamental operating principals and dynamics.
  - c. Identify system's (Equipment's) mechanical, electrical and electronic components and features.
  - d. Identify support systems (Equipment) associated with the operation (e.g., air intake filters, valve actuators, motors).
  - e. Identify and describe safety precautions and potential hazards related to operation.
  - f. For systems (Equipment) comprised of several components: Identify and describe in detail each component's function. Where applicable, group related components into subsystems. Describe subsystem functions and their interaction with other subsystems.
  - g. Identify and describe in detail safety and control interlocks.
5. Maintenance and Operation Training: Operation of Equipment:
  - a. Describe operating principles and practices.



- b. Describe routine operating, start-up and shutdown procedures.
  - c. Describe abnormal or emergency start-up, operating, and shutdown procedures that may apply.
  - d. Describe alarm conditions and responses to alarms.
  - e. Describe routine monitoring and record keeping procedures.
  - f. Describe recommended housekeeping procedures.
6. Maintenance and Operation Training: Troubleshooting:
- a. Describe how to determine if either corrective maintenance or an operating parameter adjustment is required.
- B. Training Plan shall include the following:
- 1. Training outline / syllabus
  - 2. Required trainee qualifications
  - 3. Pre-training trainee assessment process
  - 4. Description / examples of written training materials
  - 5. Description / examples of presentation materials
  - 6. Description / example of audio and visual training aids
  - 7. Training session objectives and take-aways
  - 8. Training documentation
  - 9. Post-training trainee assessment procedure
  - 10. Trainee assessment of training process
  - 11. Breakdown of classroom and field / hands-on training
  - 12. Requirements for use of O&Ms, Shop Drawings, electronic media, etc., for training
  - 13. Engineer approval of the Plan will be a prerequisite to training actually taking place.

### 3.05 CONDUCT OF TRAINING

- A. Training shall be performed for all shifts at the facility, as required, and may require to be conducted outside normal business hours to accommodate schedules of the Owner's personnel. Times shall be coordinated with the Owner.
- B. All topics of the approved Training Plan shall be discussed, in the classroom or the field, in complete and sufficient detail to allow Owner operating personnel to knowledgeably operate and maintain the Equipment in accordance with manufacturer's recommended procedures and safety considerations during all anticipated operational and maintenance situations.
- C. Safety concerns and features intended to enhance safety should be specifically addressed.
- D. Tasks required for maintaining the Warranty should be specifically addressed.
- E. Frequent reference shall be made to the Operation and Maintenance Manuals.
- F. Address all questions and comments proposed by the training session participants as they are raised to the maximum extent practicable. If questions or comments cannot be addressed during the training session, additional materials and/or training may be required as determined by the Engineer.

- G. Furnish attendees with OEPA Contact Hour Course number. Print number on final training materials. Follow OEPA guidelines for Course including documenting attendees.
- H. If any training session exceeds two (2) hours in duration, provide at least one 15-minute break.
- I. Cooperate with Contractor's videotaping personnel to ensure that all parts of the training session are legible or audible on the final tape. The Instructor shall repeat all questions to ensure that they are audible. Final acceptance of the training is contingent on acceptability of the videotape.
- J. Training sessions may also be attended by the Engineer or any other entities designated by the Owner.

END OF SECTION

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**SECTION 01 89 19**  
**LEAKAGE TEST AND DISINFECTION**

**PART 1 - GENERAL**

1.01 DESCRIPTION OF WORK

- A. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to provide leakage testing and disinfection of piping after new flow control valve is installed.

1.02 RELATED DOCUMENTS

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.03 QUALITY ASSURANCE

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.
- B. AWWA. American Water Works Association.
- C. ASTM. American Society for Testing and Materials.
- D. ACI. American Concrete Institute.

1.04 SUBMITTALS

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Test Reports
  - 1. Submit test results of all testing included in this section including, but not limited to, the following:
    - a. Pressure tests.
    - b. Tests for efficacy of disinfection.

1.05 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

3.02 EXAMINATION

- A. Examine conditions under which the pipe section, facility, or part of a facility is to be tested or disinfected and verify that conditions are satisfactory and ready for the test to proceed.

3.03 PREPARATION

- A. Protect adjacent equipment, materials, piping, and valving against drainage from testing and/or disinfection.

- B. Notify the Engineer/Architect at least 24 hours prior to any testing and/or disinfecting. Notify the Owner at least 48 hours prior to any disinfecting. Notify the Engineer/Architect immediately of all unsatisfactory or nonconforming conditions.
- C. Beginning the test means acceptance of all the existing surfaces and conditions.

#### 3.04 PRESSURE MAIN AND PROCESS PIPING LEAKAGE TESTING

- A. Provide the leakage tests as directed and as specified herein. Furnish gauges for the tests with the most recent gauge calibration test report available for review on-site.
- B. No test section shall be longer than 500 feet without approval.
- C. Leakage Allowances (unless noted otherwise)
  - 1. Pressure Mains Including Air Mains. The maximum leakage allowance for all pressure mains shall be 10.49 gallons per inch diameter per mile of pipe per 24 hours.
  - 2. Process Piping Including Air Piping. No leakage is acceptable.
- D. Test Procedure
  - 1. Slowly fill each pressure main or process piping section with water to the specified test pressure in a satisfactory manner.
  - 2. Before applying the specified test pressure, expel all air from the pipe.
  - 3. Maintain the test water pressure for at least 2 hours.
  - 4. Determine leakage by measuring the quantity of water added to the main to maintain the specified test pressure.
  - 5. Unless noted otherwise, minimum test water pressure shall be the greater of 1.5 times the working pressure or the following:
    - a. Mains or process piping carrying water – 150 pounds per square inch (psi).
    - b. Force mains – 100 psi.
    - c. Other pressure mains – 100 psi.
- E. Air Piping Test Procedure
  - 1. Backfill the section of air main to be tested prior to testing.
  - 2. Test each valved section of air main with air at the specified test pressure by means of a compressor connected to the main in a satisfactory manner.
  - 3. Bring the air pressure to 150 percent of the system's blower(s) shutoff head (but in no case greater than the pressure rating of the pipe) unless otherwise noted and maintain for at least 2 hours.
  - 4. Determine leakage by comparison of initial and final pressure gauge readings.

#### 3.05 DISINFECTION

- A. Disinfection shall consist of preliminary flushing, chlorination, final flushing, and sampling. All Contractor labor, materials equipment and incidentals required to assist the Owner in the disinfection.
  - 1. Preliminary flushing before disinfection shall remove all dirt and foreign matter.
  - 2. Final flushing of the disinfection solution utilized shall be completed by the Contractor until the chlorine solution is totally flushed out of the system being disinfected. The Contractor shall properly dispose of the chlorination solution and only points of

discharge approved by the Owner shall be utilized. In cases where direct disposal is not approved, the Contractor shall neutralize the chlorine solution as specified by AWWA.

3. Sampling shall not be taken from fire hydrants and in no case, shall the time period be less than twenty-four (24) hours after disinfection. If sampling results in two consecutive positive samples, the procedure of disinfection shall be repeated at no additional cost to the Owner.
- B. Thoroughly clean, flush, and disinfect pipes, tanks, and equipment designed to carry water for domestic consumption before acceptance by the Owner.
- C. Engineer will confirm that the item to be disinfected is thoroughly cleaned and flushed prior to disinfection.
- D. Disinfection shall be done by the addition of suitable amounts of chlorine in the form of liquid chlorine or high test hypochlorite of lime.
- E. The application shall be as approved by the Owner and in accordance with the appropriate AWWA standard listed below.
  1. Water mains are under AWWA C651.
  2. Water storage tanks are under AWWA C652.
  3. Water treatment plants are under AWWA C653.
- F. Perform tests for efficacy of disinfection, and repeat disinfection and tests as needed at no cost to the Owner.
- G. Dispose of heavily chlorinated water in accordance with AWWA C651 and AWWA C651 Appendix B, and not to a sanitary sewer or the environment unless dechlorinated sufficiently to not interfere with treatment of sanitary sewage or the environment.

### 3.06 SANITARY SEWER LEAKAGE TESTING

- A. A sanitary sewer test section shall be from the inlet end of the downstream manhole to the outlet end of the upstream manhole, including all laterals in the sewer.
- B. Leakage Allowance (unless noted otherwise)
  1. The maximum leakage allowance for all sanitary sewers shall be 100 gallons per inch diameter per mile of pipe per 24 hours.
- C. Test Procedure
  1. Use either an infiltration water test, exfiltration water test, or a low-pressure air test for gravity sewers after backfilling is completed.
    - a. Infiltration
      - 1) The infiltration test may be selected when the height of the groundwater table is 2 feet or more above the top of the pipe barrel, including house services, at the highest point of the section.
      - 2) Measure the amount of infiltration by means of a weir located in the downstream manhole, and the amount shall not exceed the allowable leakage.
      - 3) Securely seal the inlet end of the upstream manhole.
      - 4) Maintain the test head for a period of not less than 24 hours before the weir measurement is made.
    - b. Exfiltration

- 1) When the exfiltration test is selected, close the inlet ends of the upstream and downstream manholes with a watertight bulkhead.
  - 2) Fill the sewer along with the upstream manhole with water until the elevation of the water in the upstream manhole is 2 feet higher than the top of the pipe barrel, including house services, in the section being tested, or 2 feet above the existing groundwater in the trench, whichever is the higher elevation.
  - 3) Fill and maintain the entire length of section to be tested full of water for a period of approximately 24 hours prior to the start of the test.
  - 4) If the water level in the upper manhole has dropped during this 24 hour period, raise the level to the test elevation mark prior to measurement of leakage.
  - 5) Determine the exfiltration by measuring the amount of water required to maintain the above stated water elevation for a period of 2 hours from the start of the test.
  - 6) The allowable leakage is based on a maximum difference in elevation of 8 feet between the level of water at the upper manhole and the invert of the pipe being tested in the lower manhole.
  - 7) If the difference in elevation exceeds 8 feet, increase the allowable leakage 5 percent for each 1 foot in excess of 8 feet.
- c. Low-Pressure Air Test. Testing shall meet the requirements of the following standards.

<u>Pipe Material</u>	<u>Testing Standard</u>
Concrete Pipe (24-inches and under)	ASTM C924
Concrete Pipe (over 24-inches)	ASTM C1103
Clay Pipe	ASTM C828
Plastic Pipe	ASTM C1417
All Others	ASTM C1417

D. Manhole and Precast Wet Wells Leakage Testing

1. Vacuum-test all sanitary manholes for leaks, instead of the water testing specified above.
2. The vacuum test method shall be in accordance with ASTM C 1244, except as specified otherwise herein.
3. Furnish all equipment and labor required, including necessary piping/hoses, pneumatic plugs, test vacuum equipment (vacuum pump and vacuum plate/head), vacuum gauge, and second timer. The vacuum gauge shall have a maximum range of 0 to 30 inches of mercury (Hg) and the vacuum gauge figure intervals shall be in 1/2-inch increments.
4. Perform the vacuum test witnessed by the Engineer/Architect.
5. Remove all pneumatic plugs after the test.

3.07 STORAGE TANK LEAKAGE TESTING

- A. Demonstrate water tightness of all liquid-bearing tanks in accordance with ACI 350.1, "Tightness Testing of Environmental Engineering Concrete Structures."

### 3.08 FIELD QUALITY CONTROL

- A. Provide all test materials, equipment, chemicals, and water required for testing or disinfection at no additional cost to the Owner.
- B. Perform testing according to the methods described in this section.
- C. Witness
  - 1. All leakage tests shall be witnessed by Engineer and approved by the Owner before acceptance.
  - 2. Any test performed without witness by the Engineer, may require retesting the section in conformance with this specification at no cost to the Owner.
- D. Test Results
  - 1. If the field tests show excessive leakage, repair, adjust, modify, or replace the noncomplying sections until the tests are successfully completed.
  - 2. If the field tests show noncompliance with the disinfection requirements, repeat the disinfection procedure until the tests are successfully completed.
  - 3. This shall be done at no additional cost to the Owner.

### 3.09 CLEANING AND DISPOSAL

- A. Remove and dispose of all excess material and debris as a result of the work completed under this section, including testing procedures.

### 3.10 PROTECTION

- A. Protect the sections tested and approved, but prior to acceptance by the Owner.
- B. Protection of the tested and approved piping sections shall include provisions during installation and testing of nearby piping, valving, or other adjacent equipment.
- C. Remove all protective measures installed at completion and acceptance of the project.

## **PART 4 - SCHEDULE (NOT USED)**

END OF SECTION



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**SECTION 02 41 19**  
**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

**1.01 DESCRIPTION OF WORK**

- A. Contractor shall provide all labor, materials, equipment, and incidentals to perform selective demolition.
- B. Removal and Disposal
  - 1. This section requires the selective removal and subsequent off-site disposal of material to complete the work. This includes but is not limited to coring concrete to install electrical conduit, cutting existing 24" finished water header to install new valve, removal of existing High Service Pump #3 motor, modifying existing pump motor stand to accept new motor, and miscellaneous modifications to existing electrical boxes and conduit to complete the work.
- C. Salvage Materials
  - 1. Contractor shall salvage the existing High Service Pump #3 motor and transfer to on-site storage area selected by the City.
- D. Related Work Specified Elsewhere
  - 1. Remodeling construction work and patching are included within the respective sections of specifications, including removal of materials for reuse and incorporation into remodeling or new construction.
  - 2. Relocation of pipes, conduits, ducts, and other mechanical and electrical work is specified in other divisions.

**1.02 RELATED DOCUMENTS**

- A. Drawings and General provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

**1.03 QUALITY ASSURANCE**

- A. If referenced documents have been discontinued by the issuing organization, references to those documents shall be the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued.

**1.04 SUBMITTALS**

- A. The Contractor shall field verify existing measurements and conditions prior to submission of shop drawings submittals as required in Section 01 33 00, Submittals.
- B. Submittal Package No. 1 – Demolition Schedule and Documentation
  - 1. Package Contents.
    - a. Schedule indicating proposed sequence of operations for selective demolition work to Owner's Representative for review prior to start of work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
      - 1) Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

- 2) Coordinate with Owner's continuing occupation of portions of existing building and with Owner's partial occupancy of completed new addition.
- b. Photographs of existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to removal operations. Document location where each photograph is taken and date. File with Owner's Representative prior to start of work.
- c. Elevation control survey of existing adjacent structures.

#### 1.05 SPECIAL WARRANTY (NOT USED)

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION**

##### 3.01 DELIVERY, STORAGE, & HANDLING

- A. The delivery, storage, and handling of materials and equipment shall be in accordance with requirements herein, Section 01 65 00, "Delivery, Storage, and Handling", and the manufacturer's instructions.

##### 3.02 PREPARATION

- A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
  1. Cease operations and notify Owner's Representative immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
  2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
  3. Erect and maintain dustproof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
    - a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dustproof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound deadening insulation.
    - b. Provide weatherproof closures for exterior openings resulting from demolition work.
  4. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
  5. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours' advance notice to Owner if shutdown of service is necessary during changeover.
- B. Have all required equipment and manpower available at the job site prior to beginning of demolition. This includes any special equipment to permit continued uninterrupted Owner operations as required.

##### 3.03 DEMOLITION

- A. General
  1. Perform selective demolition work in a systematic manner. Use such methods as required to complete work shown in accordance with demolition schedule and governing regulations.

- a. 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.
- b. Promptly remove debris and locate demolition equipment to avoid imposing excessive loads on supporting walls, floors, or framing.
- c. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- d. Demolish foundation walls and belowgrade concrete slabs. Demolish and remove belowgrade wood or metal construction.
- e. Cut off piles 1 foot below finished grade.
- f. Remove all exposed reinforcing steel unless noted otherwise.
- g. For slabs, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible. Saw-cut a minimum of 3 inches deep around perimeter of portions of slabs to be removed.
- h. Completely fill below grade areas and voids resulting from demolition work.
- i. Promptly repair damage caused to adjacent facilities by demolition work.
- j. Explosives are not permitted to use.

B. Below Grade Demolition

- 1. Demolish foundation walls and other below grade construction, including concrete slabs as indicated on drawings or three (3) feet below surface. If discrepancy exist, the greater extent of removal shall govern.
- 2. Remove piles to a depth of not less than 12 inches below lowest foundation level.

C. Building Demolition

- 1. Demolish buildings completely and remove from site. Use such methods as required to complete work within limitations of governing regulations.
  - a. Remove small structures intact when acceptable and when approved.
  - b. Proceed with demolition in systematic manner, from top of structure to ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.
  - c. Demolish concrete and masonry in small sections.
  - d. Remove structural framing members and lower to ground by hoists, derricks, or other suitable methods.
  - e. Break up and remove concrete slabs on-grade, unless otherwise shown to remain.
  - f. Locate demolition equipment throughout structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.
- 2. Owner assumes no responsibility for actual condition of items or structures to be demolished. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.

D. Concrete

- 1. Cut all embedded anchors of removed items flush with the existing surface.

2. Plug all abandoned pipe at each end.
  3. Openings
    - a. Concrete. Close concrete openings using a nonshrink, nonmetallic grout.
    - b. New. Neatly cut or drill new openings to prevent face chipping or spalling. Repair all damaged areas to a condition equivalent to that which existed prior to the start of work.
  4. Patching
    - a. Repair all concrete that has been marred, damaged, or defaced as a result of demolition.
    - b. Procedure. Repair concrete surfaces as follows:
      - 1) Saw cut and remove concrete to a depth of not less than 1 inch.
      - 2) Remove exposed reinforcing where noted.
      - 3) Apply an approved bonding agent to the cut surface.
      - 4) Patch with a nonshrink, nonmetallic grout finished to match the existing surface unless noted otherwise.
- E. Environmental Controls
1. Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration.
  2. Comply with governing regulations pertaining to environmental protection.
  3. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
- F. Flame Cutting
1. Do not use cutting torches for removal until work area is cleared of flammable materials. At concealed spaces, such as interior of ducts and pipe spaces, verify condition of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
- G. Occupancy
1. Owner will occupy portions of the building immediately adjacent to areas of selective demolition.
  2. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations.
  3. Provide minimum of 72 hours' advance notice to Owner of demolition activities that will affect Owner's normal operations.
  4. Other restrictions related to the disruption to the Owner and restrictions on the Contractor's work are shown or listed below.
  5. Structures to be demolished shall be vacated and use discontinued prior to start.
- H. Partial Demolition and Removal
1. Remove items indicated to be removed but of salvageable value from structure as work progresses.
  2. Transport salvaged items from site as they are removed.

3. Do not store or sell removed items on-site.

I. Protection

1. Provide temporary barricades and other forms of protection to protect Owner's personnel and general public from injury due to selective demolition work.
  - a. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
  - b. Erect temporary covered passageways as required by authorities having jurisdiction.
  - c. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of adjacent facilities or work to remain, and uncontrolled collapse of structure or element to be demolished.
  - d. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
  - e. Protect floors with suitable coverings when necessary.
  - f. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
  - g. Provide temporary weather protection between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
  - h. Remove protection at completion of work.

J. Traffic

1. Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
2. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from authorities having jurisdiction.
3. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

K. Utility Services

1. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
2. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction.
3. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
4. Maintain fire protection services during selective demolition operations.

L. Miscellaneous

1. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict.

### 3.04 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off-site.
  - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
  - 2. Do not burn removed materials on project site.
- B. Burning of combustible materials from demolished structures will not be permitted.
- C. Transport and legally dispose of off-site materials per governmental regulations.

### 3.05 CLEANUP AND REPAIR

- A. Upon completion of demolition work, remove tools, equipment, and demolished materials from site.
- B. Remove protections and leave interior areas broom clean.
- C. Repair demolition performed in excess of that required.
- D. Return elements of construction and surfaces to remain to condition existing prior to start of operations.
- E. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

## **PART 4 - SCHEDULE (NOT USED)**

END OF SECTION

**SECTION 03 30 00**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.02 DESCRIPTION OF WORK

- A. Scope of Work. Furnish and install the cast-in-place concrete in accordance with the drawings and as specified herein.
  - 1. This section specifies cast-in-place concrete, including formwork, reinforcing, mix design, accessories, placement procedures, joints, finishes, curing, supports for equipment and piping, and grout toppings for tanks.
  - 2. Other specification sections may reference this section for other cast-in-place concrete items.
  - 3. Install embedded items required for material and equipment specified in other divisions of these specifications.

1.03 QUALITY ASSURANCE

- A. Codes and Regulatory Agencies. Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. Standards. Comply with the provisions of the following standards:
  - 1. ACI – American Concrete Institute.
  - 2. ASTM – American Society for Testing and Materials.
  - 3. CRSI – Concrete Reinforcing Steel Institute.
  - 4. AASHTO – American Association of State Highway and Transportation Officials.
  - 5. AWWA – American Water Works Association.
- C. Concrete Testing Service. The Owner will engage acceptable laboratory to perform material evaluation tests and to design concrete mixes at the Owner's expense. The Contractor shall coordinate and schedule all testing services.
- D. Testing. Materials and installed work may require testing and retesting at any time during progress of work. Retesting of rejected materials or installed work shall be done at Contractor's expense.
- E. Concrete Conference. Conduct conference at project site to comply with the following:
  - 1. Prior to submittal of design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Request that representatives of each entity directly concerned with cast-in-place concrete attend conference, including, but not limited to, the following:



- a. Contractor's superintendent.
  - b. Laboratory responsible for concrete mix design.
  - c. Laboratory responsible for field quality control.
  - d. Ready-Mix concrete supplier.
  - e. Concrete subcontractor.
  - f. Primary admixture manufacturers.
  - g. Engineer/Architect or Owner's Representative.
2. Concrete conference may be waived by the Engineer/Architect or Owner's Representative.

#### 1.04 SUBMITTALS

##### A. General

1. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.

##### B. Submittal Package No. 1 – Shop Drawings and Product Data

1. Product Data. Submit product data for materials and items, such as cement, reinforcement, embedded forming accessories, admixtures, patching compounds, waterstops, joint systems, and curing compounds.
2. Shop Drawings and Submittals.
  - a. Reinforcement. Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI SP-66 (88), "ACI Detailing Manual," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures, and dowel reinforcement for masonry.
  - b. Concrete Mix Designs. Submit concrete mix designs for each class of concrete to be used on the project including specifics regarding admixtures proposed for each mix design. Include concrete test reports to substantiate trial batch mixes or previous performance of the same mix design.
  - c. Materials Certificates. Submit materials certificates with the concrete mix design. Materials certificates shall be signed by manufacturer certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
  - d. Construction Joint Locations. Submit details which clearly show where construction joints are intended to be placed in walls, slabs, columns, beams, at stairwells, etc.
  - e. Box Outs. Submit proposed locations of box outs.
3. Testing Laboratories. Submit the names of the testing laboratories proposed for use to perform the material evaluation tests and also to perform the field quality control testing. An ACI certified technician shall perform all concrete testing.

- C. Submittal Package No. 2 – Batch Tickets
  - 1. Batch Tickets. Submit batch tickets for each load of concrete used on the job. Each ticket shall indicate the design mix, the project name, the date, the time of batching, and the truck number.
- D. Submittal Package No. 3 – Test Reports
  - 1. Concrete Test Reports. Submit two copies of all concrete test reports from the concrete testing laboratory directly to the Engineer/Architect.

#### 1.05 JOB CONDITIONS

- A. Coordination. Coordinate installation of joint materials, embedded items, vapor retarders, etc., with placement of forms and reinforcing steel. Coordinate concrete work with all other trades to prevent delays, errors, or omissions.
- B. Reference Material. Provide a copy of ACI SP-15, Field Reference Manual, in the field office at all times during concrete construction.
- C. Climatic Conditions. Perform placement and curing of concrete under various weather conditions in accordance with ACI 301, "Specifications for Structural Concrete for Buildings," ACI 305, "Hot Weather Concreting," and ACI 306, "Cold Weather Concreting," except as modified herein.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, and Placing Concrete."

#### 1.07 SPECIAL WARRANTY (NOT USED.)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Forms
  - 1. Exposed finish concrete forms shall be plywood, metal, metal framed plywood faced, or other acceptable panel type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown.
  - 2. Unexposed finish concrete forms shall be plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
  - 3. Cylindrical column and support forms shall be metal, fiberglass reinforced plastic, or paper or fiber tubes.
    - a. When used, provide paper or fiber tubes of laminated plies with water resistant adhesive and wax impregnated exterior for weather and moisture protection.
    - b. Provide sufficient wall thickness to resist wet concrete loads without deformation.
- B. Form coatings. Commercial formulation form coating compounds with a maximum volatile organic compound (VOC) of 350 milligrams per liter (mg/l) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- C. Form ties. Factory-fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal.

1. Provide units that will leave no metal closer than 1 inch to exposed surface.
  2. Provide ties that, when removed, will leave holes not larger than 1 1/2 inch diameter in concrete surface.
- D. Reinforcing Materials
1. Reinforcing Bars. ASTM A 615, A 616, including Supplemental Requirement S1, or A 617; Grade 60, deformed.
  2. Epoxy Coated Reinforcing Bars. ASTM A 775.
  3. Welded Wire Fabric. ASTM A 185, welded steel wire fabric, provided in flat sheets.
  4. Supports for Reinforcement. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use steel bar supports or precast concrete bar supports complying with CRSI specifications.
    - a. For slabs on grade, use steel bar supports with sand plates or horizontal runners or precast concrete bar supports where base material will not support chair legs.
    - b. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel (CRSI, Class 2).
- E. Concrete Materials
1. Portland Cement. ASTM C 150, Type I or Type II in areas where alkali-aggregate reaction is a problem. Use one brand of cement throughout project.
  2. Fly Ash. ASTM C 618, Type C or Type F including supplementary optional physical requirements, except loss on ignition shall not exceed 3 percent.
  3. Normal Weight Aggregates. ASTM C 33 and as herein specified.
    - a. For exposed concrete, provide aggregates from a single source.
    - b. For exterior exposed surfaces, do not use fine or coarse aggregates containing deleterious substances which might cause spalling.
    - c. Fine Aggregate. Fine aggregate shall consist of natural sand or manufactured sand.
    - d. Coarse Aggregate. Coarse aggregate shall consist of crushed rock, gravel, or crushed gravel.
      - 1) Grading. The coarse aggregate shall conform to requirements for Size 57, unless otherwise approved.
      - 2) Deleterious substances shall not exceed the percentages for Class 4S.
  4. Water. Potable.
  5. Admixtures. Provide admixtures that contain a maximum of 0.05 percent chloride ions by weight of cement when tested in accordance with AASHTO T260. Certificate from admixture manufacturer will be required prior to mix design approval.
    - a. Air-Entraining Admixture.
      - 1) ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

- 2) Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
  - a) Darex II or Daravair, GCP Applied Technologies
  - b) MasterAir VR 10 or MasterAir AE 200, Master Builders, Inc.
  - c) Sika AER, Sika Corp.
  - d) AEA-92 or Air Mix 200, Euclid Chemical Co.
- b. Water-Reducing Admixture.
  - 1) ASTM C 494, Type A.
  - 2) Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a) Eucon WR-75 or WR-89, Euclid Chemical Co.
    - b) WRDA with Hycol, GCP Applied Technologies
    - c) Daracem-55, GCP Applied Technologies
    - d) MasterPozzolith 220, MasterPozzolith 322, or MasterPolyheed, Master Builders, Inc.
    - e) Plastocrete 161, Sika Corp.
- c. High-Range Water-Reducing (HRWR) Admixture (Super Plasticizer).
  - 1) ASTM C 494, Type F or Type G.
  - 2) Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a) Eucon 37, Euclid Chemical Co.
    - b) Daracem 19, Daracem ML330, or Daracem ML500, GCP Applied Technologies
    - c) MasterRheobuild, Master Builders, Inc.
    - d) Sikament, Sika Corp.
- d. Noncorrosive, Nonchloride Accelerating Admixture.
  - 1) ASTM C 494, Type C or E.
  - 2) Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a) Accelguard 80, Euclid Chemical Co.
    - b) Polarset, GCP Applied Technologies
    - c) MasterSet FP 20, Master Builders, Inc.
- e. Water-Reducing, Retarding Admixture.
  - 1) ASTM C 494, Type D.
  - 2) Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a) Eucon Retarder 75, Euclid Chemical Co.

- b) Daratard-17, GCP Applied Technologies
  - c) MasterPozzoloth, Master Builders, Inc.
  - d) Plastiment, Sika Corporation.
- f. Crystalline Waterproofing Admixture. Subject to compliance with requirements, products that may be incorporated in the work include the following:
- 1) Penetron ADMIX.
  - 2) Aquafin-IC.
  - 3) Kryton KIM.
  - 4) Xypex ADMX C-Series.
  - 5) BASF Masterlife 300D.

## 2.02 ACCESSORIES

- A. Reglets. Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gauge) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Polyvinyl (PVC) Chloride Waterstops. Corps of Engineers CRD-C 572.
- 1. Waterstops for construction joints shall be serrated type without center bulb and at least 3/8 inch thick and 6 inches wide.
  - 2. Waterstop for expansion joints shall be serrated type with center bulb and at least 3/8 inch thick and 9 inches wide.
  - 3. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
    - a. Greenstreak Plastic Products Co.
    - b. DuraJoint.
    - c. BoMetals, Inc.
- C. Bitumen Waterstops
- 1. Provide a single component self-sealing plastic adhesive type waterstop which is nonoxidizing, nonevaporating, nonexpanding, non-shrinking, and resistant to water, chemicals, and saturated hydrogen sulfide.
  - 2. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
    - a. Synko-Flex, Synko-Flex Products.
    - b. Seal-Tite, DuraJoint.
- D. Sand Cushion. Clean, manufactured or natural sand conforming to ASTM C 33 or C 144.
- E. Vapor Retarder. ASTM E 1745 Class A Compliant with a permeance of 0.01 before and after mandatory conditioning as required by (ASTM E 1745 Section 7.1 and Sub-paragraphs 7.1.1 – 7.1.5).
- 1. Provide vapor retarder cover over prepared base material where indicated below slabs on grade.

2. Subject to compliance with these specifications, the vapor retarder may be one of the following:
  - a. Stego Wrap 15 mil by Stego Industries, LLC
  - b. Vapor Flex by Layfield
  - c. Moistop Ultra 15 by Fortifiber Industries
- F. Chemical Hardener. Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.
  1. Use hardener on existing concrete where noted.
  2. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Surfhard, Euclid Chemical Co.
    - b. Lapidolith, Sonneborn
    - c. Fluohard, L&M Construction Chemical, Inc.
- G. Sealer/Dustproofers
  1. Floor hardener compound for new concrete shall be an acrylic containing not less than 14 percent solids.
  2. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Super Diamond Clear VOX, Euclid Chemical Company.
    - b. Dress and Seal WB30, L&M Construction Chemicals, Inc.
- H. Absorptive Cover. Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M 182, Class 2.
- I. Moisture-Retaining Cover. One of the following complying with ASTM C 171.
  1. Waterproof paper.
  2. Polyethylene film.
  3. Polyethylene coated burlap.
- J. Curing Compound. Clear styrene acrylate type, 30 percent solids content minimum.
  1. Submit test data from an independent testing laboratory indicating a maximum moisture loss of 0.55 kilograms (kg) per square meter when applied at a coverage rate of 200 square feet per gallon.
  2. Verify compatibility of curing compound with finishes to be used.
  3. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Super Diamond Clear VOX, Euclid Chemical Company.
    - b. Dress and Seal WB30, L&M Construction Chemicals, Inc.
- K. Evaporation-Control Compound
  1. Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

2. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Aquafilm, Dayton Superior
    - b. Eucobar, Euclid Chemical Co.
    - c. E-Con, L&M Construction Chemicals, Inc.
    - d. MasterKure ER 50, Master Builders, Inc.
- L. Bonding Compound
1. Polyvinyl acetate or acrylic base.
  2. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Polyvinyl Acetate (Interior Only). Appropriate product by:
      - 1) Dayton Superior Corp.
      - 2) Euclid Chemical Co.
      - 3) Larsen Products Corp.
      - 4) L&M Construction Chemicals, Inc.
    - b. Acrylic or Styrene Butadiene. Appropriate product by:
      - 1) Euclid Chemical Co.
      - 2) GCP Applied Technologies
      - 3) Master Builders, Inc.
      - 4) Stonhard, Inc.
- M. Epoxy Adhesive
1. ASTM C 881, two-component material suitable for use on dry or damp surfaces.
  2. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
    - a. Sikadur 32 Hi-Mod, Sika Corp.
    - b. Euco Epoxy System #452 or #620, Euclid Chemical Co.
    - c. Epobond, L&M Construction Chemicals, Inc.
- N. Expansion Joint and Isolation Joint Material. Use one of the following unless noted otherwise.
1. Self-expanding cork conforming to ASTM D 1752, Type III.
  2. Cellular fiber-asphalt conforming to ASTM D 1751.
  3. Neoprene/SBR polymer conforming to ASTM D 1056-67.

## 2.03 MIXES

### A. General

1. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.

2. If trial batch method used, retain an acceptable independent testing facility for preparing and reporting proposed mix designs.
  3. The testing facility shall not be the same as used for field quality control testing.
  4. Submit mix designs of each proposed mix for each class of concrete at least 15 days prior to start of work.
  5. Do not begin concrete production until proposed mix designs have been reviewed.
  6. Limit use of fly ash not to exceed 25 percent of cement content by weight.
    - a. In areas where alkali aggregate reaction is a problem, do not add less than 20 percent fly ash by weight.
    - b. When used, fly ash shall replace cement at a 1:1 ratio for Class C fly ash and a 1.25:1 ratio for Class F fly ash (Class F fly ash to cement).
    - c. Adjust weights of concrete materials to provide the correct yield.
- B. Design Mixes. Provide normal weight concrete with the following properties, unless otherwise indicated. Tolerance for air content shall be  $\pm 1$  percent.
1. Class A. 4,000 pounds per square inch (psi), 28-day compressive strength.
    - a. Water/Cementitious Product (w/c) ratio, 0.45 maximum; minimum cementitious material, 541 pounds per cubic yard (cy).
    - b. 6 percent air.
  2. Class B. 3,000 psi, 28-day compressive strength.
    - a. w/c ratio, 0.50 maximum; minimum cementitious material, 541 pounds per cy.
    - b. 6 percent air.
  3. Class C. 2,000 psi, 28-day compressive strength.
    - a. w/c ratio, 0.6 maximum; minimum cementitious material, 376 pounds per cy.
    - b. 6 percent air.
  4. Class D.
    - a. w/c ratio, 0.45 maximum; minimum cementitious material, 846 pounds per cy.
    - b. Fine aggregate to cement ratio shall not exceed 3.0 by weight.
    - c. 6 percent air.
  5. Class S. 4,500 psi, 28-day compressive strength.
    - a. w/c ratio, 0.42 maximum; minimum cementitious material, 564 pounds per cy.
    - b. 6 percent air.
  6. Class W. In accordance with Class S, except:
    - a. Contains crystalline waterproofing admixture in accordance with paragraph 2.1.E.5.f.
    - b. Dose in accordance with admixture manufacturer's recommendations.
- C. Slump Limits. Proportion and design mixes to result in concrete slump at point of placement as follows:
1. Ramps and sloping surfaces. Less than 3 inches.



2. Reinforced foundation systems. 2 to 4 inches.
  3. Concrete containing HRWR admixture (Superplasticizer). Less than 8 inches after addition of HRWR to site verified 2-inch to 3-inch slump concrete without HRWR.
  4. Other concrete. Less than 4 inches for slabs and less than 5 inches for walls, curbs, bases, and other miscellaneous concrete.
- D. Chloride Content. The maximum water-soluble chloride ion content, expressed as a percent by weight of cement contributed by all ingredients of the concrete mix shall not exceed 0.10 percent.
- E. Controlled Density Fill or Controlled Low-Strength Material. The fine aggregates shall be fine enough to stay in suspension in the mixture to the extent required for proper flow. Provide with the following properties, unless otherwise indicated:
1. 100 psi, 28-day compressive strength.
    - a. Cement, 100 pounds.
    - b. Fly Ash, 250 pounds.
    - c. Fine Aggregate, Saturated Surface Dry, 2,800 pounds.
    - d. Water, 500 pounds maximum.
  2. It is necessary for bleed water to appear on the surface immediately after the fill is struck off.
    - a. A delay in bleeding indicates there are too many fines in the mixture, so reduce the fly ash quantity in increments of 50 pounds until mixture is bleeding freely.
    - b. Add approximately 60 pounds of sand to replace each 50-pound increment of fly ash to maintain the original yield.
- F. Dry Pack Mortar. Mix dry pack, consisting of one part portland cement to 2 1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
- G. Cement Mortar. A mixture of sand, cement, and water in the same proportions used for the concrete being placed, but omit all coarse aggregate.
- H. Adjustment to Concrete and Mixes. Request mix design adjustments when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as approved. Submit laboratory test data for revised mix design and strength results for acceptance before using in work.
- I. Admixtures. Use of Admixtures.
1. Use water-reducing admixture for placement and workability in all classes of concrete unless noted otherwise.
  2. A noncorrosive nonchloride accelerating admixture may be used in concrete slabs placed at ambient temperatures below 50 degrees Fahrenheit (° F.) when approved.
  3. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content as indicated in the design mix.
- J. Concrete Mixing. Ready Mix Concrete. Comply with requirements of ASTM C 94 and as specified.
1. When air temperature is between 85° F. and 90° F., mixing and delivery time shall not exceed 75 minutes.

2. When air temperature is above 90° F., mixing and delivery time shall not exceed 60 minutes unless approved otherwise.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Tolerances. Unless otherwise specified, tolerances shall be in accordance with ACI 117 and ACI 301.
- B. Inspection. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other trades to permit installation of their work; cooperate with other trades in setting such work. Verify that all wood, dirt, foreign objects, and all other debris have been removed from inside the formwork. Verify that reinforcing steel is spaced to provide the proper coverage against forms and against earth for slabs on grade. When requested, provide documentation of inspection prior to placing concrete.
- C. Site and Weather Conditions. Do not place concrete when site conditions exist such as standing water, extreme heat or cold, etc., unless the proper precautions have been taken to properly place and protect concrete as recommended by ACI and as acceptable. Do not place concrete on frozen ground.

#### **3.02 PREPARATION**

- A. Forms
  1. General. Design, erect, support, brace, and maintain formwork to support vertical and lateral, static and dynamic loads that might be applied until concrete structure can support such loads. Maintain formwork construction tolerances complying with ACI 347.
  2. Forms. Construct forms to sizes, shapes, lines, position, elevation, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
  3. Fabrication of Forms. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
  4. Openings. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
  5. Exposed Corners and Edges. Chamfer exposed corners and edges using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
  6. Provisions for Other Trades. Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases

from trades providing such items. Accurately place and securely support items built into forms.

7. Cleaning and Tightening. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.
8. Form Coatings. Coat contact surfaces of forms with an approved, nonresidual, low VOC, form coating compound before reinforcement is placed.
  - a. Do not allow excess form coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
  - b. Coat steel forms with a nonstaining, rust preventative material. Rust stained steel formwork is not acceptable.
  - c. Form coatings for use in water treatment plants shall be nontoxic after 30 days from the date the forms are removed.

B. Reuse of Forms

1. Clean and repair surfaces of all forms to be reused in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
2. Successive Reuse. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces except as acceptable.

### 3.03 INSTALLATION

A. Vapor Retarder Installation

1. General. Install vapor retarder where shown on drawings per ASTM E/643-10. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.
2. Lapping. Lap joints 6 inches and seal vapor barrier joints with manufacturer's recommended mastic and pressure sensitive tape.
3. Protection. After placement of vapor retarder, cover with sand cushion, dampen and compact to 100 percent as determined by ASTM D 698 to the depth as shown on drawings. Sand shall be free of self-draining water when concrete is placed.

B. Placing Reinforcement

1. General. Comply with CRSI's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports and as herein specified.
  - a. Avoiding cutting or puncturing vapor retarder barrier during reinforcement placement and concreting operations.
2. Cleaning. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
3. Installation.

- a. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved.
- b. Place reinforcement to obtain at least minimum coverages for concrete protection as noted in ACI 301. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- c. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh plus 2 inches or 8 inches and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### C. Joints

1. Construction Joints. Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable.
  - a. Provide keyways 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Accepted bulkheads designed for this purpose may be used for slabs.
  - b. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as otherwise indicated.
  - c. The maximum length of wall pours shall not exceed 40 feet, and slab pours shall not exceed 40 feet in length or width.
  - d. Bond fresh concrete to hardened new concrete as follows:
    - 1) For horizontal joints, place new concrete on a 1-inch layer of cement mortar evenly spread over the previously placed concrete. Thoroughly clean and remove laitance of previously placed concrete.
    - 2) For vertical joints, thoroughly clean the surface of the hardened concrete and remove all laitance prior to placing new concrete.
  - e. If noted on the drawings, prior to placement of new concrete against old existing concrete, apply bonding agent to surface of old concrete, if accessible, immediately before placement of new concrete.
  - f. Make provisions to support and protect exposed waterstops during progress of work. Field-fabricate joints in waterstops in accordance with manufacturer's printed instructions. Provide continuous waterstops in construction joints as follows:
    - 1) Liquid-bearing walls and slabs.
    - 2) Walls or slabs subject to groundwater and/or in contact with ground.
    - 3) Elsewhere as indicated.
2. Isolation Joints in Slabs-on-Ground. Construct isolation joints as indicated in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as shown. Fill joints where noted with sealant specified in other sections of these specifications.
3. Contraction (Control) Joints in Slabs-on-Ground. Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use saw cuts 1/8 inch wide by

1/4 slab depth, unless otherwise indicated. In lieu of saw cutting and with, the Contractor may form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.

- a. Saw-cut as soon as possible after slab finishing without dislodging aggregate.
  - b. If joint pattern not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
  - c. Provide joint, filler, and sealant materials where shown.
4. Control Joints in Retaining Wall. Provide control joints at 32 feet on center maximum unless otherwise shown. Provide 1-1/2 inch deep by 1/3 wall thickness vertical keyway. Horizontal reinforcing shall not pass through joint. Joints need not be provided in retaining wall footings.
  5. Expansion Joints. Construct expansion joints where shown. If not shown, provide expansion joints at interval not to exceed the following:
    - a. Retaining Walls. 96 feet (not required in footings).
  6. Waterstop. Provide waterstops in all joints shown on the drawings and as listed in this specification.
    - a. Provide PVC waterstops in all joints unless noted or specified otherwise.
    - b. Properly support and wire all waterstops to reinforcing to remain straight and true. Heat-splice all joints per manufacturer's recommendations.
    - c. Provide bitumen waterstop in joint between new and existing concrete.
- D. Installation of Embedded Items
1. Set and build into the work, anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by other prime Contractors and suppliers of items to be attached thereto.
  2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
  3. Set edge forms, bulkheads, and intermediate screed strips for slabs to obtain required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

E. Concrete Placement

1. Location. Provide concrete as specified in the table below unless otherwise indicated on the drawings.

Location	Design Mix
All reinforced concrete and nonreinforced fillets	4,500 psi Class S
Nonreinforced concrete not designated as Class A, C, or D	3,000 psi Class B
Nonreinforced so designated on plans	2,000 psi Class C
Grout fill or topping as designated on plans	Class D

2. General. Comply with ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
  - a. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness, or to be resistant to the penetration of a vibrator. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete to avoid segregation at its final location.
3. Placing Concrete in Forms. Deposit concrete in forms in horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
  - a. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
  - b. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators 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 set. At each insertion, limit duration of vibration to time necessary to consolidate concrete around reinforcement and other embedded items without causing segregation of mix.
4. Placing Concrete Slabs. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
  - a. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners. When epoxy coated reinforced steel is used, vibrators shall have nonmetallic heads.
  - b. Bring slab surfaces to correct level with straightedge and strike off. Use highway straightedge, bull floats, darbies, or other means to obtain a smooth surface which is free of humps or hollows and that conforms to the required flatness and levelness. Do not disturb slab surfaces prior to beginning finishing operations.

- c. Maintain reinforcing in proper position during concrete placement.
5. Cold Weather Placing. Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- a. When air temperature has fallen to or is expected to fall below 40° F. (4° C.), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50° F. (10° C.) and not more than 80° F. (27° C.) at point of placement.
  - b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
6. Hot Weather Placing. When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
- a. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90° F. (32° C.). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
  - b. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
  - c. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
  - d. Use water reducing retarding admixture when required by high temperatures or other adverse placing conditions, when acceptable to Engineer/Architect.
  - e. Use evaporation control compound in accordance with manufacturer's recommendations or fogging.
7. Adjusting Concrete Slump at Job Site.
- a. Slump Greater than Specified. Do not use concrete with slump greater than specified.
  - b. Slump Less than Specified. If on arrival at the job site, the slump of the concrete is less than specified, the following remedies may be used at the Contractor's option.
    - 1) Add water only if the maximum specified w/c ratio is not exceeded.
    - 2) Additional water shall be accompanied by a quantity of cement sufficient to maintain the specified w/c ratio.
    - 3) Add an approved water reducing admixture.

F. Controlled Density Fill Placement

- 1. General. Unless noted otherwise, place controlled density fill in overexcavated areas under slabs, in utility trenches within roadways, and as directed by the Engineer/Architect.

2. Mixing Equipment. Sufficient mixing capacity of mixers shall be provided to permit the fill to be placed without interruption.
  3. Placing Fill. Flowable fill shall be discharged from the mixer by any reasonable means into the space to be filled. The fill material shall be brought up uniformly to the fill line shown on the plans or as directed. Placing of any material over low strength fill may commence as soon as the surface water is gone or as directed.
- G. Finish of Formed Surfaces. Inside face of covered basins, clear wells and reservoirs, filters below the media line, open tanks and flumes below water or flow lines, and the outside of structures below finish grade lines shall be classified as not exposed to view.
1. Finish. Finish formed concrete surfaces in accordance with the schedule below.

Location	Type of Finish
Concrete surfaces not exposed to view or surfaces to be covered with a coating material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or other similar system	Smooth form finish
Concrete exposed to view including surfaces which will be painted	Smooth rubbed finish or grout-cleaned finish

2. Smooth Form Finish. This is an as-cast concrete surface obtained with selected form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
3. Smooth Rubbed Finish. Provide smooth-rubbed finish not later than 1 day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
4. Grout-Cleaned Finish. Mix one part portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout with the consistency of thick paint. Substitute white portland cement for a part of the gray portland cement in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or a spray gun. Immediately after applying the grout, scrub the surface with a cork float or stone to coat the surface and fill all air bubbles and holes. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, burlap, or other means. After the surface whitens from drying, rub with clean burlap. The finish shall be kept damp for at least 36 hours after final rubbing.
5. Related Unformed Surfaces. At tops of walls, horizontal offsets, and similar unformed surfaces occurring 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.

H. Slab Finishes

1. Finish. Finish slab surfaces in accordance with the schedule below unless finish is specifically noted on the drawings:



Location	Type of Finish
Slabs to receive grout topping	Rough finish
Slabs to receive concrete topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated	Scratch finish
Slabs to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated	Float finish
Slabs of tanks, flumes, channels, wet wells, etc., which are submerged including grout toppings	Trowel finish after float finishing
Slabs to be exposed to view or covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thin film finish coating system	Trowel finish after float finishing
Slabs to be covered with ceramic quarry tile installed with thin set mortar	Float finish followed by trowel and fine broom finish
Exterior concrete platforms, steps, ramps, and elsewhere as indicated	Float finish followed by nonslip broom finish

2. Floor Levelness, General. Floor levelness requirements below do not apply to sloped slabs or unshored slabs on metal deck.
3. Scratch Finish. After placing slabs, plane surface to tolerances for floor flatness (Ff) of 20 and floor levelness (Fl) of 17. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
4. Float Finish. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, when concrete has stiffened sufficiently to permit operation of power driven floats, or both. Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of Ff 25 - Fl 20. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
5. Trowel Finish. After floating, begin first trowel finish operation using a power driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of Ff 50 - Fl 35. Grind smooth surface defects that would telegraph through applied floor covering system.
6. Trowel and Fine Broom Finish. Apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.

7. Nonslip Broom Finish. Immediately after float finishing, slightly roughen concrete surface by brooming with stiff fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer/Architect before application.
  8. Rough Finish. The bottom of concrete tanks which are to receive grout topping shall receive a rough finish for maximum adhesion. The surface to receive the grout topping shall be intentionally roughened to a minimum amplitude of 1/4 inch.
  9. Chemical Hardener Finish. Apply chemical hardener finish to existing interior concrete floors where indicated. Clean floors and allow to dry before applying hardener.
    - a. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.
    - b. After final coat of chemical hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.
  10. Sealer/Dustproofer Finish. All exposed surfaces and floors within buildings which will be subject to pedestrian or vehicular traffic under normal operation, shall be treated to seal and dustproof the surface. This shall be accomplished by the use of a liquid sealer/dustproofer applied in three applications in accordance with the manufacturer's directions. Application of the sealer/dustproofer shall be performed as late as possible and just prior to completion of construction.
- I. Placing Grout Toppings. Grout toppings shall be Class D concrete mix design unless noted otherwise.
1. Procedure.
    - a. Prior to placement of the structurally bonded topping, remove all laitance, debris, and loose and foreign material from the base slab. Use water-blasting, sandblasting, or other methods acceptable to the Engineer/Architect.
    - b. Thoroughly wet the base slab before placing the grout topping. Remove all standing water from the surface prior to placing neat cement grout.
    - c. Brush in neat cement grout as a bonding agent immediately before application of grout topping. Do not allow neat cement grout to set prior to placing grout topping.
    - d. Where recommended by manufacturer, use the tank mechanism to screed the grout on the tank floor as it is placed. Screed in accordance with the manufacturer's instructions.
    - e. Trowel finish topping as specified above.
    - f. Moisture cure grout toppings as specified herein.
- J. Miscellaneous Concrete Items
1. Filling In. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
  2. Equipment Bases and Foundations. Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment complying with diagrams or templates of manufacturer furnishing machines and equipment.

### 3.04 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas. Repair and patch defective areas and plug form tie holes with cement mortar immediately after removal of forms, when acceptable to Engineer/Architect.
1. Cut out honeycomb, rock pockets, and voids over 1/4 inch in any dimension down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding compound. Place patching mortar before bonding compound has dried.
  2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface. After shrinkage has occurred, grind surface until flush.
- B. Repair of Formed Surfaces. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer/Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
- C. Repair of Unformed Surfaces. Repair or replace supported slabs that fail to meet the specified finish requirements. Correct levelness and flatness, and low and high areas as herein specified. For slabs on grade, remove slab between control joints and replace with concrete slab meeting floor finish and tolerances. For all other unformed surfaces, repair as follows:
1. Repair finished unformed surfaces that contain defects that affect durability of concrete. Surface defects, as such, include crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
  2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
  3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with patching compound. Finish repaired areas to blend into adjacent concrete. Underlayment compounds may be used when acceptable.
  4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- D. Miscellaneous Repairs. Repair isolated random cracks and single holes not over 1 inch in diameter by dry pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry pack mortar before bonding compound has dried. Compact dry pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

- E. Approval. Perform structural repairs with prior approval of Engineer/Architect for method and procedure, using specified epoxy adhesive and mortar.
- F. Alternative Repair Methods. Repair methods not specified above may be used, subject to acceptance.

### 3.05 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General. Employ an approved testing laboratory to perform tests and to submit test reports. ACI Grade 1 certified technician employed by the testing laboratory shall be present during the placing of all concrete. The concrete testing laboratory shall send two copies of all test reports directly to the Engineer/Architect.
- B. Sampling Fresh Concrete. Sample concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.
  - 1. Slump. Slump tests shall be performed at the point of truck discharge prior to adding plasticizers in accordance with ASTM C 143. For each class of concrete, perform one test for each compressive strength test and additional tests when concrete consistency seems to have changed. If the slump is adjusted at the job site, the concrete testing agency shall be responsible for reporting the following.
    - a. Method used to adjust slump.
    - b. Quantity of each material added.
    - c. Resulting slump.
  - 2. Air Content. Perform daily for each class of concrete placed in accordance with ASTM C 173 volumetric method for lightweight concrete; ASTM C 231 pressure method for normal weight concrete; one test for each compressive strength test, one test for the first load of each type of air entrained concrete delivered, and one test for each truck when air content is adjusted until consistent results are obtained.
  - 3. Concrete Temperature. Test hourly when air temperature is 40° F. (4° C.) and below, when 80° F. (27° C.) and above, and each time a set of compressive test specimens is made.
  - 4. Compressive Test Specimen. Perform in accordance with ASTM C 31 and as follows:
    - a. Prepare one set of four standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cured test specimens are required. Contractor may also prepare field cured test specimens to be used for early form removal.
    - b. Prepare one set of cylinders for each 100 cy of concrete or fraction thereof, of each concrete class placed in any one day.
    - c. Perform compressive strength tests in accordance with ASTM C 39. Test one specimen at 7 days, and two specimens at 28 days, and hold one specimen in reserve for later testing if required.
    - d. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
    - e. When total quantity of a given class of concrete is less than 50 cy, Engineer/Architect may waive strength test if adequate evidence of satisfactory strength is provided.

- f. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
  - g. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. **Compressive Strength Test Reporting.** Test results will be reported in writing to Engineer/Architect, Ready-Mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- D. **Flatness and Levelness.** Conduct random tests for flatness and levelness in accordance with ASTM E 1155 within 24 hours after final finish and as directed. Pay the cost for testing and any retesting of the areas found not to conform to the specifications after the Contractor has corrected the defects.
- E. **Floor Slope.** Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having required slope within 24 hours after final finish and as directed.
- F. **Nondestructive Testing.** Impact hammer, ultrasonic pulse velocity, or other nondestructive device may be permitted if approved, but shall not be used as the sole basis for acceptance or rejection.
- G. **Additional Tests.** The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure. These tests shall be as directed. Testing service shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Be responsible for all costs associated with such tests.

### 3.06 DEMONSTRATION

- A. **General.** Prior to final acceptance of concrete work, demonstrate to representatives of the Owner and the Engineer/Architect that there are no mechanical defects or damaged areas and that concrete exposed to view is acceptable as to function and appearance.
  - 1. **Walls and Other Formed Surfaces.** Representatives of the Owner, Contractor, and Engineer/Architect shall review concrete work to verify that tie holes and air voids have been patched, seams have been ground smooth, all surface defects have been repaired, and all rubbed or rubbed and painted surfaces are acceptable in appearance.
  - 2. **Floors.** Representatives of the Owner, Contractor, and Engineer/ Architect shall review concrete work to verify that all surface defects have been repaired, all stains removed, residue from floor sealer/dustproof or chemical hardener has been removed, and that the required finish is acceptable. Where requested, flood selected areas of floor to a depth satisfactory to demonstrate that the area or areas drain properly to the floor drains and sumps and that there are no areas ponding water outside acceptable tolerances. Furnish water for testing and convey it to the areas being examined.
  - 3. **Liquid-Bearing Structures.** All structures designed to hold water or other liquids shall be demonstrated to be watertight in accordance with ACI 350.

- B. Repair or Replacement of Defective Work. Correct concrete work which is unacceptable in accordance with paragraph 3.4 of this section entitled "Concrete Surface Repairs." Remove concrete which, in the opinion of the Engineer/Architect, cannot be repaired satisfactorily and replace in an acceptable manner at no additional cost to the Owner.

3.07 CONCRETE CURING AND PROTECTION

- A. General. Protect freshly placed concrete from premature drying and excessively cold or hot temperatures. In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation control compound. Apply in accordance with manufacturer's instructions.
- B. Curing Duration. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Keep continuously moist for not less than 7 days. Maintain concrete temperatures as recommended in ACI 301 throughout the curing period.
- C. Curing Methods. Perform curing of concrete by curing compound, by moist curing, by moisture-retaining-cover curing, and by combinations thereof in accordance with the schedule below unless curing method is specifically noted on the drawings. If unspecified, Contractor may opt for any of the methods specified below. Prior to use of curing compound on any surface, verify compatibility between curing compound and finish surface treatment.

Location	Curing Method
Floors and other unformed concrete surfaces	Any specified curing method
Formed concrete surfaces	Moist curing prior to form removal, followed by any of the methods specified below
Slabs to receive grout topping	Moisture cure
All other concrete	Any specified curing method

1. Moisture Curing. Provide moisture curing by following methods:
  - a. Keep concrete surface continuously wet by covering with water.
  - b. Use continuous water fog spray.
  - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing. Provide moisture-cover curing as follows:
  - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound. Provide curing compound as follows:
  - a. Apply specified curing compound to concrete as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). For formed surfaces, apply curing compound immediately after

form removal. Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's directions. Apply in two coats, spread in perpendicular directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

- b. Use curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- c. Do not use curing compounds on surfaces which are to be covered with coating material applied directly to concrete, chemical hardener, waterproofing, damp proofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet that is not compatible with curing compound), painting, and other coatings and finish materials, unless otherwise approved.

### 3.08 SHORES AND SUPPORTS

- A. Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.
- B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.
- C. Extend shoring at least three floors under floor or roof being placed for structures over four stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.
- D. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete or to supporting floors. Locate and provide adequate reshoring to support work without excessive stress or deflection.
- E. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

### 3.09 REMOVAL OF FORMS

- A. Formwork which is not supporting the weight of concrete, such as sides of beams, walls, columns, and similar parts of the work may be removed after cumulatively curing at not less than 50° F. (10° C.) for 24 hours after placing concrete, provided concrete is sufficiently hard not to be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structure elements, may not be removed in less than 14 days and until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field cured specimens representative of concrete location or members.
- C. Form facing material may be removed 3 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

### 3.10 PROTECTION OF FORMED AND UNFORMED CONCRETE SURFACES

- A. Protect concrete from damage or discoloration during the construction period caused by subsequent work performed by all other trades, including, but not limited to, concrete forming, resteel placement, equipment installation, plumbing work, electrical work, construction loading to the point of overstressing concrete, and all other actions which might adversely affect the strength or appearance of the concrete. Repair of chipped or damaged concrete and removal of rust, stains, efflorescence, and surface deposits shall be accomplished by acceptable methods.

END OF SECTION



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## SECTION 05 05 23

### ANCHOR BOLTS, EXPANSION ANCHORS, AND ADHESIVE ANCHORS AND DOWELS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

##### 1.02 DESCRIPTION OF WORK

- A. Provide all labor, materials, tools, and equipment necessary to furnish and install the anchor rods, expansion anchors, and adhesive anchors and dowels in accordance with the drawings and as specified herein.

##### 1.03 QUALITY ASSURANCE

- A. Standards. Ensure that materials and workmanship are in conformance with the following standards as referenced herein:
  - 1. AISI – American Iron and Steel Institute.
  - 2. ASTM – American Society for Testing and Materials.
- B. Installer Training. Conduct a thorough training with the manufacturer or the manufacturer's representative. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:
  - 1. Hole drilling procedure.
  - 2. Hole preparation and cleaning technique.
  - 3. Adhesive injection technique and dispenser training/maintenance.
  - 4. Rebar dowel preparation and installation.
  - 5. Proof loading/torquing.

##### 1.04 SUBMITTALS

- A. Submit the following submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. Submittal Package No. 1 – Shop Drawings, Product Data, and Design Criteria
  - 1. Schedule. No products shall be delivered or installed before this submittal package has been reviewed and approved.
  - 2. Submittal Package Contents.
    - a. Copies of manufacturer's specifications, load tables, data, and dimension diagrams for the devices including manufacturer's recommended working load for each size and type of anchor proposed for use.
    - b. Certification that materials conform to ASTM specifications.
    - c. Certification that products conform to requirements of Underwriters' Laboratory or Factory Mutual.
    - d. Setting drawings and templates for location and installation of anchorage devices.

- e. Anchor rods and bolts showing dimensions and material of construction.
  - f. When the size, length, or load carrying capacity of an anchor rod, expansion anchor, and adhesive anchor is not shown on the drawings, provide the size, length, and capacity required to carry the design load times a minimum safety factor of four.
  - g. Design Loads. Those imposed by the service conditions and as follows:
    - 1. Equipment Anchors. Use the design load recommended by the equipment manufacturer and accepted by the Owner or Engineer.
    - 2. Allowances for vibration are included in the safety factor specified above.
  - h. Design Data. Provide design load documentation and calculations for items sized or selected.
  - i. Installation instructions for adhesive anchors.
- C. Submittal Package No. 2 – Samples
- 1. Schedule. No equipment shall be delivered or installed before this submittal package has been reviewed and approved.
  - 2. Submittal Package Contents. Two samples of each type anchor and its components. Samples of anchor rods will not be required.

1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery. Clearly mark all items according to purpose and intended location.
- B. Storage and Handling. Store and handle all items in accordance with the manufacturer's recommendations, but in no case exposed to the weather.

1.07 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MATERIALS/MANUFACTURERS

- A. Threaded and Nuted Anchor Rods
  - 1. In accordance with ASTM A 276, AISI Type 316.
  - 2. Nuts in accordance with ASTM F 594, Group 2, and tack-welded to anchor rod.
- B. Cracked Concrete Anchors
  - 1. Provide cracked concrete anchors where International Building Code (IBC) 2018 is the design code and specified on the drawing details. Anchors that are approved for "cracked concrete" situations shall meet the requirements stated in ACI-318-19 Chapter 17.
  - 2. Manufacturers. Subject to compliance with the specifications, provide cracked concrete anchors from one of the following approved manufacturers.
    - a. Expansion Anchors
      - 1. Simpson Strong-Tie, Strong-Bolt 2.
      - 2. Hilti, Inc., Kwik-Bolt-TZ.
      - 3. Simpson Titan-HD.
      - 4. Hilti HSL-3.

5. Hilti HDA.
- b. Adhesive Anchors
  1. Simpson Strong-Tie SET-XP
  2. Hilti HIT-RE 500 V3.
- C. Expansion Anchors
  1. Provide stainless steel expansion anchors, nuts, and washers complying with ASTM A 276, AISI Type 316.
  2. Expansion anchors shall be Underwriters' Laboratories, Factory Mutual, or International Code Council – Evaluation Service (ICC-ES) report approved.
  3. Subject to compliance with the specifications, provide expansion anchors from one of the following approved manufacturers.
    - a. Simpson Strong-Tie, Wedge-All.
    - b. Wej-it Corporation.
    - c. Hilti, Inc., Kwik-Bolt 3.
    - d. Ramset Company, Red Head, Trubolt.
- D. Adhesive Anchors
  1. Provide adhesive cartridge as recommended by the manufacturer for the loading and depth required.
  2. Provide Type 316 stainless steel threaded rod, nut, and washer or a reinforcing bar of the size and embedment shown on the drawings and in accordance with ASTM A 615, Grade 60.
  3. Subject to compliance with the specifications, provide adhesive cartridges from one of the following approved manufacturers.
    - a. Simpson Strong-Tie, SET Epoxy.
    - b. Simpson Strong-Tie, AT Acrylic Adhesive.
    - c. Hilti, HIT-HY 200.
    - d. ITW/Red Head, C6+ Epoxy.
    - e. Hilti HIT-RE 500 V3.
- E. Adhesive-Anchored Reinforcing Bar.
  1. Provide adhesive cartridges as recommended by the manufacturer to receive reinforcing bar as noted.
  2. Manufacturer/Model. Subject to compliance with the specifications, provide adhesive cartridges from one of the following approved manufacturers.
    - a. Simpson Strong-Tie, SET Epoxy.
    - b. Simpson Strong-Tie, AT Acrylic Adhesive.
    - c. Hilti HIT-RE 500 V3.
    - d. ITW/Red Head, C6+ Epoxy.
    - e. Hilti HIT-HY 200.
  3. Reinforcing Bar. Comply with Section 03 30 00.

- F. Powder-Actuated Fasteners. Do not use powder-actuated fasteners and other types of bolts and fasteners.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine conditions under which rods, bolts and anchors are to be installed, and notify the Engineer in writing of unsatisfactory conditions existing. Do not proceed with the work until unsatisfactory conditions or deficiencies have been corrected.

#### **3.02 PREPARATION**

- A. Notify the Engineer prior to the installation of all adhesive anchors.

#### **3.03 INSTALLATION**

- A. Do not install anchor rods, expansion anchors, or adhesive anchors until the item to be anchored and the anchoring device as well as related layout drawings have been accepted.
- B. Drilling and setting equipment used and installation of expansion anchors and adhesive anchors shall be in accordance with manufacturer's instructions.
- C. Drill holes to depth and diameter recommended by manufacturer.
- D. Clean all holes for adhesive anchors in strict accordance with the manufacturer's instructions.
- E. Use the type of anchoring device shown.
- F. Unless otherwise shown, conform to following for expansion anchors.
  - 1. Minimum embedment depth in concrete – 5 diameters.
  - 2. Minimum anchor spacing on centers – 10 diameters.
  - 3. Minimum distance to edge of concrete – 5 diameters.
  - 4. Increase dimensions above if required to develop the required anchor load capacity.
- G. Unless otherwise shown, conform with the manufacturer's recommendations for minimum embedment depth, minimum anchor spacing, and minimum edge distance for adhesive anchors except that minimum embedment depth in concrete shall not be less than 4 inches unless noted otherwise.
- H. Use copper-graphite antiseize compound for all anchor nuts. Thoroughly lubricate all threaded fasteners with compound prior to assembly. Remove excess lubricant after fastener installation.

#### **3.04 FIELD QUALITY CONTROL**

- A. Inspection. Inspect each installation for compliance with this specification and manufacturer's recommendations.
- B. Testing. At the discretion of the Owner, adhesive anchors may be subjected to pullout-type testing up to the manufacturer's recommended working load for the anchor. If deficient anchors are found, the Contractor will be required to test all anchors and replace any deficient anchors found at no additional cost to the Owner.
- C. Material Testing
  - 1. At the discretion of the Owner up to 1 percent or up to three (whichever is greater) of each type and size of bolt, nut, washer, and anchor from each and every separate shipment or purchasing lot that are specified to be Type 316 stainless steel may be destructively tested to verify material requirements.

2. Samples will be randomly selected for this testing and be provided at no additional cost to the Owner.
3. Conduct testing at the Owner's expense.
4. The above testing may be performed at any time during the Contract.
5. Any shipment or purchasing lot, installed or not, which fails to meet the requirements of the specifications will be rejected and shall be immediately removed from the job site and replaced with material that meets the specifications.
6. Removal and replacement of noncomplying material shall be at the Contractor's expense.

### 3.05 CLEANING

- A. After embedding concrete is placed, remove protection and clean rods, anchors, and inserts.

END OF SECTION

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## SECTION 07 92 01

### CAULKING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

##### 1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the caulking in accordance with the drawings and as specified herein.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Regulatory Agencies. Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. Standards. Materials and workmanship shall be in accordance with the following standards referenced herein.
  - 1. ASTM – American Society for Testing and Materials.
  - 2. FS – Federal Specification.
  - 3. NSF – National Sanitation Foundation.

##### 1.04 SUBMITTALS

- A. Product Data. Submit manufacturer's specifications, including manufacturer's published data indicating that material complies with the specifications and is intended for the applications shown, recommendations and installation instructions for caulking compound and associated miscellaneous material required.
- B. Color Chart. Submit manufacturer's standard color chart for color selection by the Owner.

##### 1.05 JOB CONDITIONS

- A. Environmental Conditions
  - 1. Proceed with installation of caulking under weather conditions when temperatures are within manufacturer's recommended limitations for installation.
  - 2. Proceed with the work only when forecasted weather conditions are favorable for proper cure and development of high early bond strength.
  - 3. Wherever joint width is affected by ambient temperature variations, install caulking only when temperatures are in the lower third of the manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.
  - 4. Avoid mixing sealants in direct sunlight when high temperatures prevail.
- B. Protection
  - 1. Allow no caulking to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces including rough textured materials.



2. Use masking tape or other precautionary devices to prevent staining of adjoining surfaces by either the primer/sealer or caulking materials.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

##### A. Delivery

1. Each unit shall be labeled with the following:
  - a. Name of material and supplier.
  - b. Formula or specification number, lot number, color, and date of manufacture.
  - c. Mixing instructions, shelf life, and curing time when applicable.

##### B. Storage

1. Store or expose no materials to temperatures above 90 degrees Fahrenheit (° F.) or in direct sunshine.
2. Use no materials which are outdated as indicated by shelf life.
3. Store sealant tape in a manner which will retain shape.
4. Store containers where temperature is approximately 75° F. for 16 hours before using.

##### C. Handling. Open no containers or mix components until necessary preparatory work and priming have been completed.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 CAULKING

- A. Type. Two component, premium grade, polyurethane base, elastomeric sealant formulated for total immersion with a nonsag and self-leveling consistency.
- B. Color. As selected by the Owner.
- C. Requirements
  1. Meet ASTM C920 and FS TT-S-00227E.
  2. Type. M.
  3. Grade. NS.
  4. Class. 25.
  5. Use. NT, M, G, A.
  6. Elasticity. Minimum 50 percent at 0 degrees Fahrenheit (° F.).
  7. NSF "Approved for Contact with Potable Water."

#### 2.02 MISCELLANEOUS

- A. Joint Cleaner. Provide the type of joint cleaning compound recommended by the caulking manufacturer for all joint surfaces.
- B. Joint Primer/Sealer. Provide the type of joint primer/sealer recommended by the caulking manufacturer for all joint surfaces.
- C. Bond Breaker Type. Polyethylene tape or other plastic tape as recommended by the caulking manufacturer to be applied to sealant contact surfaces where bond to the substrate

or joint filler must be avoided for proper performance of caulking. Provide self-adhesive tape wherever applicable.

- D. Sealant Backer Rod. Compressible rod stock polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with caulking by the manufacturer. Provide size and shape of rod which will control the joint depth.

## 2.03 PRODUCTS AND MANUFACTURERS

- A. Products. Provide one of the following:
  - 1. Sikaflex 2cNs, two-component by Sika Chemical Company.
  - 2. Or equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. General. Comply with caulking manufacturer's written instructions except where more stringent requirements are shown or specified.
- B. Areas to Be Caulked
  - 1. Interior and exterior perimeter of all door and window frames.
  - 2. Interior and exterior perimeter of all louvers and wall openings.
  - 3. Interior and exterior joints formed by the junction of masonry work, concrete, and precast decking.
  - 4. All ceiling joints of precast concrete slabs.
  - 5. Wall panel, fascia, soffit, and coping joints.
  - 6. All reglets and expansion joints.
  - 7. Where else shown on the drawings and as required by the Engineer/Architect.
- C. Surface Preparation
  - 1. Remove dirt, moisture, loose material, and other substances that would interfere with bond.
  - 2. Clean joint surface with oil free pressurized air immediately before installation of primer/sealer.
- D. Mixing
  - 1. Two Component. Follow manufacturer's written instructions.
    - a. Thoroughly mix components before use.
    - b. Add entire contents of activator and color components to base material. Do not mix partial units.
    - c. Mix contents for 3 to 5 minutes as recommended by manufacturer and until color and consistency are uniform.
    - d. Do not use mixture after pot life has expired.
- E. Priming. Prime all joint surfaces.
  - 1. Allow no primer or sealer to spill or migrate onto adjoining surfaces.

2. Allow primer to dry prior to application of sealants.

F. Isolation Joint

1. Apply masking tape before installation of primer in continuous strips in alignment with the joint edge to produce sharp, clean interface with adjoining materials. Remove tape immediately after joints have been sealed and tooled as directed.
2. Install no sealants without backer rods or bond breaker tape, unless shown otherwise.
3. Roll the back-up rod stock into the joint to avoid lengthwise stretching. Do not twist, braid, puncture, or prime backer rods.

G. Placement

1. Caulking shall be by gun method. Select gun nozzle to suit conditions and provide a full bead of caulking throughout the joint.
2. Use installation techniques that will ensure caulking to be deposited in a uniform, continuous ribbon without skip marks, pin holes, air pockets, and uniform bond on opposite sides, produced by a complete "wetting" of the joint bond surfaces equally on the opposite sides.
3. Follow with hand tool in finished areas for a uniform neat appearance.

3.02 CLEANING AND PROTECTION

A. Cleaning. Clean adjacent surfaces of sealant or soiling resulting from the work.

1. Use solvent or cleaning agent recommended by the caulking manufacturer.
2. Leave all finish work in a neat clean condition.

B. Curing Time. Allow the minimum curing time as recommended by the manufacturer, but in no case shall the curing time be less than 72 hours.

C. Protection. Protect the caulking during the construction period so that it will be without deterioration, soiling, discoloration, or damage at the time of final acceptance.

END OF SECTION

## SECTION 09 90 00

### PAINTING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENT

- A. General. Drawings and general provisions of Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

##### 1.02 DESCRIPTION OF WORK

- A. Scope of Work. This section includes surface preparation, painting, and finishing of exposed interior and exterior surfaces. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
- B. Coding and Banding. Contractor shall match existing color scheme used and naming convention used at the Northeast Water Treatment Plant. Contractor shall submit color sample to Owner for final selection and approval.
- C. Definitions. "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

##### 1.03 QUALITY ASSURANCE

- A. Standards. Ensure that material and workmanship are in accordance with the following standards as referenced herein:
  - 1. SSPC – The Society for Protective Coatings.
  - 2. Corps of Engineers.
  - 3. NSF – NSF International.
  - 4. ICRI – International Concrete Repair Institute.
  - 5. ASTM – American Society for Testing and Materials.
  - 6. NACE – National Association of Corrosion Engineering.
  - 7. NAPF – National Association of Pipe Fabricators, Inc.
- B. Single Source Responsibility. Provide primers, coats, and finish coats from the same manufacturer.
- C. Compatibility of Work
  - 1. Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates.
  - 2. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - 3. Notify the Engineer/Architect of problems anticipated using the materials specified.

## 1.04 SUBMITTALS

### A. General

1. Submit all submittals in accordance with the Division 1 Submittal Requirements and this specification section.

### B. Submittal Package No. 1 – Product Data

1. Product Data.
  - a. Submit manufacturer's technical information, label analysis, and application instructions for each material proposed for use.
  - b. List each material and cross-reference the specific coating, finish system, and application.
  - c. Identify each material by the manufacturer's catalog number and general classification.

### C. Submittal Package No. 2 – Color Charts

1. Samples. Submit manufacturer's color charts for Owner's use.

## 1.05 JOB CONDITIONS

### A. Environmental Conditions

#### 1. Climatic.

- a. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 40 degrees Fahrenheit (° F.) and 90° F.
- b. Apply solvent thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45° F. and 95° F.
- c. Do not apply paint:
  - 1) In precipitation or fog of any kind.
  - 2) When the relative humidity exceeds 85 percent.
  - 3) At surface temperatures less than 5° F. above the dew point.
  - 4) To damp or wet surfaces.
- d. When approved, continue painting during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

#### 2. Ventilation.

- a. Be responsible for maintaining adequate ventilation, temperature, and humidity control in all areas where paint is being applied, drying, or curing.
  - 1) "Adequate" ventilation, temperature, and humidity levels are considered to be those required by regulatory agencies and guidelines, the paint manufacturer's product application data, the requirements of this section, and the Owner's Representative.

B. Warning Signs

1. Provide and display prominent warning signs indicating "WARNING - PAINTING AND ABRASIVE BLASTING WORK UNDERWAY" throughout the job site wherever surface preparation or painting operations are being performed.
  - a. These signs shall be no less than 3' x 3' in size, and placed at clearly visible locations near all points of access by person or vehicle to the work area(s).

C. Lead Bearing Paint. Contractor is responsible for providing means to remove paint from steel frames in a manner that complies with the local, state and federal rules and regulations regarding protecting workers and surrounding areas from dust migration while preparing areas for painting in accordance with other sections of this Section 09 90 00 Painting.

D. Priming and Painting Fireproofing of Exposed Structural Steel.

1. Painting New Exposed Structural Steel to be Covered by Fireproofing: Contractor is responsible for coordination of shop/prime coat of structural steel that will be covered by fireproofing after fabrication and/or erection. A prime coat of paint shall be provided in the shop that is approved by the Fireproofing Manufacturer. Fireproofing shall not be coated until all field installation by trades is complete. Any fireproofing shall be repaired prior to application of paint to protect fireproofing. The primer and top coats shall be compatible with the fireproofing material. All fireproofing will be painted in accordance with the schedule provided for new exposed structural steel provided under this contract that is designated to have fireproofing.
2. Painting Existing Exposed Structural Steel that has Fireproofing. All existing exposed structural steel that has previously been covered with fireproofing, shall be painted to match new work per paint schedule. Contractor to repair any existing fireproofing that has been disturbed prior to application of new paint to match new work. All paint coatings shall be approved by fireproofing manufacturer for compatibility.
3. Repairs: Prior to painting exposed structural steel that has been fireproofed, the Contractor will repair any fireproofing that is disturbed or damaged by demolition work, or during installation of new work that disturbs or damages fireproofing on existing structural steel, shall be repaired in accordance with manufacturer recommendations for surface preparation and application of fireproofing to those in areas being repaired. The repaired areas will be primed with suitable primer paint, and a new finish paint applied in accordance with the paint schedule.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery. Deliver materials to the job site in the manufacturer's original, unopened containers bearing a label from the manufacturer that includes the following:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Federal Specification number, if applicable.
4. Manufacturer's stock number and date of manufacture.
5. Contents by volume, for pigment and vehicle constituents.
6. Thinning and application instructions.
7. Color name and number.

8. Manufacturer's name.
- B. Storage
1. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45° F.
  2. Keep storage area in a clean condition, free of foreign materials and residue.
  3. Store clean rags in a metal container with a tight-fitting cover.
  4. Remove oily rags and waste daily.
- C. Handling. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.07 SPECIAL WARRANTY (NOT USED.)

**PART 2 - PRODUCTS**

2.01 MANUFACTURERS

- A. Use products of the manufacturers listed in the painting schedule. No "Or Equals" will be considered for this project. Submit any potential substitutes according to the General Conditions.

2.02 PIPE BANDING TAPE, LABELING, AND DIRECTIONAL ARROWS

- A. Minimum 2 inches wide, self-sticking.
- B. Meets ASTM B 946.
- C. 5-mil minimum thickness.
- D. Label text heights shall be sized as follows:

Under 3/4"	Arrows only
3/4" to 1-1/4"	1/2"
1-1/2" to 2"	3/4"
2-1/2" to 6"	1-1/4"
8" to 10"	2-1/2"
10" and over	3-1/2"

- E. Approved Manufacturers
1. W. H. Brady Company.
  2. Seton Identification Products.
  3. Or equal.

2.03 THINNERS

- A. Use only the recommended products of the manufacturer furnishing the paint.

## 2.04 COLORS.

- A. All colors not specified will be selected by the Owner. Where multiple coats are specified, shade-tint each coat of paint for visual inspection of the number of coats applied.

## 2.05 POTABLE WATER CONTACT

- A. Coatings in contact with potable water shall meet NSF Standard 61 and shall be listed by NSF.

# **PART 3 - EXECUTION**

## 3.01 EXAMINATION

- A. Compliance
  - 1. Examine substrates and conditions for compliance with paint application requirements.
  - 2. Correct unsatisfactory conditions before painting.
  - 3. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
  - 4. If any surface to be finished cannot be put in proper condition, notify the Engineer/Architect immediately in writing or assume full responsibility for failure to do so and correct any unsatisfactory work.

## 3.02 PREPARATION

- A. General Procedures
  - 1. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or protect them before surface preparation and painting.
  - 2. Remove these items if necessary for complete painting of the items and adjacent surfaces.
  - 3. Following completion of painting operations in each space or area, reinstall items by workers skilled in the trades involved.
  - 4. All surfaces must be clean, dry, and free of oil, grease, chalk, and other containments.
  - 5. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet paint.
- B. Surface Preparation. Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.
  - 1. Provide barrier coats over incompatible primers or remove and reprime.
  - 2. Cementitious Materials. Prepare concrete, concrete masonry block, cement plaster, and mineral fiber reinforced cement panel surfaces to be painted.
    - a. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents.
    - b. Roughen as required to remove glaze.
    - c. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.



- d. Use abrasive blast cleaning methods according to SSPC-SP13/NACE 6, ICRI CSP 2-3 to prepare concrete unless an alternate method is approved.
  - e. Prepare all concrete surfaces designated chemical resistant per ICRI CSP 3-5 minimum with all bugholes opened and filled with an epoxy surfacer (Paint Code F in the Schedule).
  - f. Determine alkalinity and moisture content of surfaces by performing appropriate tests.
    - 1) If surfaces are sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application.
    - 2) Do not paint surfaces where moisture content exceeds the manufacturer's recommendations.
3. Wood.
- a. Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required.
  - b. Sand surfaces smooth which are exposed to view and remove dust when finished.
  - c. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer before application of primer.
  - d. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
4. Ferrous Metals. Clean nongalvanized ferrous metal surfaces; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC-SP1/SP2/SP3.
- a. Blast steel surfaces that will be submerged in accordance with requirements of SSPC Specification SSPC-SP 10, near white blast cleaning. Maintain a minimum 2-mil profile.
  - b. Abrasive-blast-clean nonsubmerged steel per SSPC-SP 6, Commercial Blast Cleaning creating a minimum 1.5-mil profile.
  - c. Brush off blast cleaned (SSPC-SP 7, Brush-Off Blast Cleaning) epoxy shop-primed surfaces that will be submerged and have not been painted for 60 days or longer before application of the intermediate and finish coats.
  - d. Blast ductile iron surfaces in accordance with requirements of NAPF 500 Abrasive Blast Cleaning.
  - e. Touch up bare areas and prime coats that have been damaged. Surface preparation shall be the same as the original surface preparation. Touch up with the same primer as the shop coat.
  - f. Prime all surfaces blast-cleaned on the same day or before rusting or soiling occurs.
5. Plastic. Clean surface and sand uniformly to resemble 80-100 grit sandpaper.
6. Existing Epoxy Finishes. Thoroughly and uniformly sand or otherwise abrade prior to recoating.

- C. Materials Preparation. Carefully mix and prepare paint materials in accordance with manufacturer's directions.
  - 1. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
  - 2. Stir material before application to produce a mixture of uniform density; stir as required during application.
  - 3. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
  - 4. Use only thinners approved by the paint manufacturer, and only within recommended limits.

### 3.03 APPLICATION

#### A. Requirements

- 1. Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
- 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  - a. Paint colors, surface treatments, and finishes are indicated in Part 4 of this section.
  - b. Provide finish coats that are compatible with primers used.
  - c. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
  - d. Grind all 90-degree angles of carbon steel and apply a stripe coat of the specified primer.

#### B. Special Techniques/Requirements

- 1. Do not permit spraying unless approved in writing.
- 2. Ensure that the application, drying time between coats, and mixing are in accordance with the recommendations of the manufacturer.
- 3. Protect all areas from damage by equipment, materials, splatterings, drippings, and overspray. Take particular care to prevent staining of concrete. Immediately remove all splattering, dripping, and overspray. Paint or repaint any area discolored or stained as directed.
- 4. Prior to installation, finish-paint all surfaces inaccessible after installation.

### 3.04 MARKING

- A. Color Coding. Paint and mark according to function all exposed piping as specified in Part 4 of this section.

- B. Banding. Band all exposed piping as specified in Part 4 of this section. Space banding as directed, but not greater than 10 feet apart with a minimum of one group of bands between fittings.
- C. Flow Arrows. Provide arrows indicating flow direction on all exposed piping.
- D. Labeling. Label all exposed piping with the function of the pipe. Apply labeling on any single run of pipe before any tees or elbows, but not greater than 20 feet on center.

### 3.05 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as desired during the period when paint is being applied.
  - 1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.
  - 2. If test results show material being used does not comply with the published manufacturer's specifications for that paint system:
    - a. Stop painting.
    - b. Remove noncomplying paint.
    - c. Pay for testing.
    - d. Repaint surfaces coated with rejected paint.
    - e. Remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.
- B. The Owner reserves the right to check the minimum dry mil thickness per coat (MDMTPC) at any time following application. Repaint areas not meeting minimum requirements.
- C. Provide a 10' x 10' mock-up of each specified system, including surface preparation and finish color. The mock-up may remain as part of the completed project. Proceed with the rest of the paint application when authorized to proceed in writing.

### 3.06 PROTECTION

- A. Cover. Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage in an acceptable manner by cleaning, repairing or replacing, and repainting.
- B. Signs
  - 1. Provide "wet paint" signs to protect newly painted finishes.
  - 2. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
  - 3. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
  - 4. Remove all "Wet Paint" signs and other warning signs utilized during installation and curing.

### 3.07 DEMONSTRATION

- A. Visual. The Contractor, Owner, and Engineer/Architect will visually review the painting for completion, colors, finish, and uniformity before acceptance by Owner.

## **PART 4 - SCHEDULE**

### 4.01 GENERAL

- A. Dry Film Thickness Per Coat. DFT is the acronym for this term in the following schedules. Do not exceed the manufacturer's recommended maximum dry film thickness per coat.
- B. New Work. Paint all new surfaces.
- C. Existing Areas
  - 1. Compatibility Test. Before painting, patch test all areas for compatibility of new paint with existing and notify the Engineer/Architect of any incompatibility.
  - 2. Adhesion Test. Before painting, perform the tests per ASTM D 3359, Methods A and/or B, followed by a report detailing the system tested, their results, and any recommended changes to the specified system.
  - 3. Disturbed Areas.
    - a. Paint all surfaces of existing areas disturbed due to tie-ins, closing of openings, cutting new openings, rerouting of pipe, relocating or removal of equipment, and other related work as specified herein.
    - b. Color match existing surface and paint to lap existing by not less than 3 inches.

4.02 PAINT SCHEDULE

Surface Substrate	Surface Location	Immersed or Below Grade	Exterior Only	Interior Only	Exterior / Interior	Required Coats	DFT	Paint Codes
Concrete Block or Masonry  <ul style="list-style-type: none"> <li>• Paint Interior of all new Exposed Concrete Block</li> <li>• Paint all other Masonry Where Noted in the Plans or Specifications</li> </ul>	Walls			X		1 Primer/Block Filler 1 Intermediate 1 Finish	1 2 4 4	A B B B
	Walls		X			1 Primer/Block Filler 1 Intermediate 1 Finish	1 2 6 6	A M M M
	<i>Walls, Existing painted</i>					<i>1 Primer 1 Intermediate 1 Finish</i>	<i>4 4 4</i>	<i>B B B</i>
	Walls and Ceilings			X		1 Primer/ Surfacer 1 Finish	1 2 4	F B B
	Walls and Ceilings		X			1 Primer/ Surfacer 1 Intermediate 1 Finish	1 2 6 6	F M M M
	Walls, Ceilings, and Floors, In Contact with Potable Water	X			X	1 Primer/Surfacer 1 Intermediate 1 Finish	- 4 4 4	F C C C
Walls, Ceilings, and Floors, In Contact with Nonpotable Water or Sewage	X			X	1 Primer/Surfacer 1 Intermediate 1 Finish	- 1 0 1 0	F D D D D	
Walls and Floors, Chemical Resistant				X	1 Primer/ Surfacer 1 Intermediate 1 Finish	1 2 9 9	F H H H	
Floors			X		1 Primer/ Surfacer 1 Intermediate 1 Finish	1 2 9 9	F E E E	

For paint codes see paragraph 4.03 at the end of this Section.

Surface Substrate	Surface Location	Immersed or Below Grade	Exterior Only	Interior Only	Exterior / Interior	Required Coats	DFT	Paint Codes
<p>Ferrous Metal Products</p> <ul style="list-style-type: none"> <li>• Paint all Miscellaneous Fabrications</li> <li>• Paint all Ferrous Metal Products including Piping, Valves, Fittings, Equipment, and Miscellaneous Metals Installed during Project.</li> <li>• Paint existing Ferrous Metal Products Where Noted in the Plans or Specifications.</li> <li>• Metal Siding, Fascia, and Coping shall be prefinished by the manufacturer.</li> <li>• Paint all exposed galvanized conduit and pipe in painted finished areas.</li> <li>• Paint all damaged and disturbed areas of any galvanized products such as threading or field-welds.</li> <li>• Do not paint stainless steel, aluminum, galvanized steel or similar corrosion resistant materials unless noted otherwise in the drawings or the specifications.</li> </ul>	Submerged, In Contact with Potable Water	X			X	1 Shop/Primer 1 Touch Up 1 Intermediate 1 Finish	4 4 4 4	C C C C
	Submerged, In Contact with Nonpotable Water or Sewage	X			X	1 Shop/Primer 1 Finish	10 10	D D
	High Temperature (<450 °F)				X	1 Shop/Primer 1 Intermediate 1 Finish	1.6 1 1	J L L
	Very High Temperature (450 °F to 750 °F)				X	1 Shop/Primer 1 Intermediate 1 Finish	1.6 1 1	K K K
	Galvanized Product Touch-ups				X	1 Primer 1 Finish	2 2	P P
	Exterior			X		1 Shop/Primer 1 Touch Up 1 Intermediate 1 Finish	4 4 4 4	B B B G
	Interior			X		1 Shop/Primer 1 Touch Up 1 Intermediate 1 Finish	4 4 4 4	B B B B

For paint code details, see paragraph 4.3 at the end of this Section.Surface Substrate	Surface Location	Immersed or Below Grade	Exterior Only	Interior Only	Exterior / Interior	Required Coats	DFT	Paint Codes
<p><b>Structural Steel</b></p> <ul style="list-style-type: none"> <li>Paint interior Exposed Structural Steel in <i>Screen Building and Screenings Rooms</i> with primer that is approved by fireproofing manufacturer. Paint all exposed structural steel after installation of fireproofing is complete.</li> <li>Paint all Structural Steel concealed in walls with shop primer and touch-up after field installation.</li> <li>Paint all existing exposed structural steel to match new work.</li> <li>Paint all structural steel that support equipment, platforms, and walkways, but do not provide support of the building.</li> </ul>	Exposed Steel in Screen Buildings that will be fireproofed			X		1 Primer approved by Fireproofing Mfr. <i>Fireproofing by others</i>	4	Q
	Exposed Structural Steel with Fireproofing (Existing and New Steel)			X		1 Primer 1 Touch Up 1 Intermediate 1 Finish	4 4 4 4	B B B G
	Concealed Structural Steel embedded in Walls			X		1 Shop/Primer 1 Touch Up	4 4	B B
	Existing structural steel that is embedded in walls.			X		1 Touch Up	4	B
	Exposed Structural Steel Supports for equipment, platforms, walkways except for galvanized or aluminum or non-ferrous fabrications.				X	1 Primer 1 Touch Up 1 Intermediate 1 Finish	4 4 4 4	B B B G

Plastic Products <ul style="list-style-type: none"> <li>Paint all exposed interior Plastic Pipe, Fittings, and Valves installed in this project or where noted in the plans or specifications.</li> </ul>		X			1 Primer 1 Intermediate 1 Finish	4 4 4	B B G
			X		1 Primer 1 Finish	2 3	B B
Wood Products <ul style="list-style-type: none"> <li>Paint all exposed Wood installed in this project or where noted in the plans and specifications except for Prefinished, Redwood, or Pressure-Treated Products.</li> </ul>				X	1 Primer 1 Intermediate 1 Finish	2 2 2	N O O
Foam Piping Insulation <ul style="list-style-type: none"> <li>Paint all Foam Piping Insulation Where Noted in the Plans or Specifications.</li> </ul>				X	1 Primer 1 Finish	2 4	N O
Drywall and Plaster <ul style="list-style-type: none"> <li>Paint all exposed Drywall and Plaster installed in this project or where noted in the plans or specifications.</li> </ul>			X		1 Primer 1 Intermediate 1 Finish	2 4 4	N O O
Pipe Coverings and Pipe Drains	Match walls and ceilings						

For paint code details, see paragraph 4.3 at the end of this Section.



4.03 MANUFACTURERS AND PAINT CODES

Generic Name	Code	Tnemecc	PPG	Carboline	ICI/Devoe	Sherwin Williams	International
Cementitious Acrylic or Polyamide Epoxy Block Filler	A	Series 130-6602 Envirofill	Aquapon 97-685 Series	Sanitile 600	Bloxfill 4000 Block Filler	Cement Plex 875	Intercryl 320
Polyamide Epoxy	B	Series N69-H.B. Epoxoline II	Aquapon HB 97-130	Carboguard 893 SG	Devran 224 HS	Macropoxy 646 FC	Intergard 251
Polyamide Epoxy NSF 61 Approved	C	Series N140 Pota-Pox Plus	Aquapon 95-132	Carboguard 561	Bar-Rust 233H	Macropoxy 646 PW	Interseal 670HS
Coal Tar Epoxy/Ultra High Build Epoxy	D	Series 46H-413 Black HB Tneme-Tar	Coal Cat 97-650	Bitumastic 300M	Devtar 5A	Hi-Mil Sher Tar	Interzone 954
Self-Leveling/ Polyamide Epoxy	E	Series 281 Tneme-Glaze	Megaseal SL 99-6680	Sanitile 945	DevFloor 525 with DevFloor 571	Cor-Cote HP	Intergard 345
Filler and Surfacer	F	Series 218 MortarClad	Megaseal CF 99-6672 or -6675	Sanitile 600 TG	DevFloor 574 / Bloxfill 4000	Steel Seam FT 910 or General Polymers 3513	Ceilmote 610 / Corocrete SF
Polyurethane	G	Series 1074 H.B. Endura-Shield II	Pitthane Ultra 95-812	Carbothane 134 HG	Devthane 379	Acrolon 218HS	Interthane 870
Novolac Epoxy	H	Series 282 Tneme-Glaze	Megaseal SC/HSN	Semstone 145	Devran 124	ExpressCote HCR	Ceilmote 2000 w/ Ceilmote 680
Not Used	I						
High Temperature Primer	J	Series 90E-92 Tneme-Zinc	Silicone-Acrylic Red	Carbozinc 11	HT-8	Zinc Clad II	Interzinc 22
High Temperature Silicone (Resists at least 450 °F)	K	Series 39	Speedhide 6-230	Thermaline 4900 R	HT-8	Kem Hi-Temp Heat-Flex 450	Intertherm 875

Generic Name	Code	Tnemec	PPG	Carboline	ICI/Devoe	Sherwin Williams	International
Very High Temperature Silicone (resists at least 1000 °F and requires a bake cure)	L	Series 39	Speedhide 6-220	Thermaline 4700	HT-10 Aluminum	Hi-Temp 1000V	Intertherm 50 Aluminum
Elastomeric Acrylic	M	Series 156/157 Envirocrete	Permacrete 4-110	Flexxide Elastomer	#2200 Decra-Flex Elastomeric	Loxon XP	N/A
Acrylic Primer	N	Series 10-10-99W	Seal Grip 17-921	Carbocrylic 120	Devflex 4020	DTM Primer Finish	Intercryl 520
Acrylic	O	Series 6 Tneme-Cryl	Pitt Tech 90-474	Carbocrylic 3359	Devflex 4208	DTM Acrylic	Intercryl 530
Cold Galvanizing Compound	P	Minimum 95% Zinc. Approved Manufacturers: Rust-Oleum, ZRC, or Chesterton 752, or Sherwin Williams Cold Galvanizing Aerosol.					
Shop applied primer for Structural Steel that will receive fireproofing	Q	Provide special shop prime coat to fabricated structural steel after cleaning and fabrication that is approved by fireproofing manufacturer. Field touch up prior to installation of fireproofing. Solvent based fireproofing products must be compatible with primer. Contractor to apply minimum 4 mils of flat, low end epoxy primer per schedule, or other primer that is approved by fireproofing manufacturer.					

END OF SECTION

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**SECTION 26 00 01**  
**BASIC ELECTRICAL REQUIREMENTS**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 01 33 00, "Submittals."
  - 2. Section 01 50 00, "Temporary Construction Facilities."
  - 3. Section 01 65 00, "Delivery, Storage and Handling."
  - 4. Section 01 79 00, " Demonstration and Training."
  - 5. Section 01 74 23, "Cleaning."
  - 6. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 7. Section 40 90 00, "Instrumentation System Basic Requirements"

1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and materials necessary to implement the following general administrative and procedural requirements in accordance with the plans and as specified herein.
- B. Extent of Work. Work under this Contract consists of furnishing, installing, testing, and guaranteeing of complete electrical systems as shown on the drawings and as specified in Division 26. The Contractor shall connect and place all wired equipment in proper working order. Refer to the plans and specifications for work included in this Contract. Some general guidelines to coordinating work between Division 26 and Divisions 40 and 43 are as follows:
  - 1. Division 26 includes the installation of all conduits or other raceways with power, control, interlocking wiring between panels, and instruments supplied under the instrumentation Division 40 scope
  - 2. Division 26 includes all 3-phase power for plant equipment provided under Divisions 40 and 43. The instrumentation and control system as specified in Division 40 wiring and interior raceways is not work of Division 26. Exterior raceways for the instrumentation and control system are part of Division 26 work to the extent shown on the plans. Field wiring for plant equipment is work of Division 26. All Division 26 work for Divisions 40 and 43 equipment is shown on the plans.
  - 3. No generalities regarding the coordination of work with the work of Divisions other than 40 and 43 can be made. See the plans for the extent of these requirements for Division 26 work.
- C. Temporary Utilities. Temporary utilities and connections include the following:
  - 1. Temporary telephones for the Engineer/Architect's field office.
  - 2. Temporary lighting to provide adequate illumination of work areas and security.

3. Temporary power and connections to maintain existing equipment in operation and to permit operation of new equipment as construction progresses.

### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  1. All work shall be installed in full accordance with the latest edition of the National Electrical Code (NEC) as prepared and published by the National Fire Protection Association (NFPA) and any applicable local or state codes. All electrical equipment shall be listed and labeled by Underwriters' Laboratories, Inc. (UL) or any approved independent nationally recognized electrical testing laboratory where such standards exist. Optionally, in lieu of such listing and labeling, equipment preapproved by the Electrical Inspector may be supplied. Wherever UL compliance is mentioned in the specifications, the above alternatives shall be understood to apply to all listing and labeling requirements. This does not preempt or replace the specifications or replace the approval process. All service switches/circuit breakers shall be labeled as outlined above for service entrance duty.
  2. Comply with the requirements of NFPA Code 241 "Standards for Safeguarding Construction, Alteration, and Demolition Operations," the American National Standards Institute (ANSI) A10 Series standards for "Safety Requirements for Construction and Demolition," and the National Electrical Contractors Association (NECA) National Joint Guideline NJG-6 "Temporary Job Utilities and Services."
- B. Permits and Regulations. The Contractor shall obtain all permits and inspections required by laws, ordinances, rules, regulations, and public authority having jurisdiction and shall obtain certificates of such inspections and shall submit same to the Engineer/Architect and shall pay all fees, charges, and expenses in connection therewith. The Contractor shall furnish to the Owner a certificate of final inspection from the proper authority prior to final payment. Obtain and pay for easements required to bring temporary utilities to the site, where the Owner's easement cannot be utilized for that purpose.

### 1.04 SUBMITTALS

- A. General. Follow the procedures specified in Section 01 33 00, "Submittals," and in addition, the Contractor shall prepare and submit a complete submittal list to the Engineer. The submittal list shall include all submittal items covered in the Division 26 specification sections. In addition, the submittal list shall contain dates for all items to be submitted and shall accompany the first submittal. The submittal list shall be coordinated with the construction schedule and shall clearly show such coordination.
- B. Shop Drawings. Shop drawings shall be submitted to the Engineer for review for compliance with the Contract Documents. Shop drawings shall identify the specific equipment and material being supplied; the location on the project where it is to be used; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams, and any other information necessary to determine compliance with the plans and specifications. Typical shop drawing review will require 10 working days following receipt of all information necessary to determine compliance with the plans and specifications. If the submittal schedule or actual submittal contains too large a quantity to allow a 10-day turnaround, the Contractor will be so informed as early as possible. The added number of days required for review will be determined at that time. Fabrication and installation shall be in accordance with the approved shop drawings. Products submitted as substitutions shall

be clearly marked as such in the submittal. Please see general and supplemental conditions for further requirements for substitutions.

1. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for distribution plus two copies of each submittal which will be retained by the Engineer/Architect.
  - a. Shop Drawings - Initial Submittal. One additional blue or black line print.
  - b. Shop Drawings - Final Submittal. One additional blue or black line print.
  - c. Product Data. One additional copy of each item.
  - d. Samples. One additional for each item.
- C. Additional copies may be required by individual sections of these specifications.
- D. Permits and Easements. Submit copies of reports, permits, and easements necessary for installation, use, and operation.
- E. Test Reports. Submit copies of reports of tests, inspections, and meter readings as specified. Tests, inspections, and meter readings shall be performed using the Contractor's temporary power source unless otherwise specified.
- F. Coordination Drawings
  1. Prepare and submit prior to commencing such work coordination drawings in accordance with Division 1 section "Project Coordination" to a scale of 1/4" = 1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work, including (but not necessarily limited to) the following:
    - a. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
      - 1) Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
      - 2) Exterior wall and foundation penetrations.
      - 3) Fire rated wall and floor penetrations.
      - 4) Equipment connections and support details. Demonstrate evidence of dimensional coordination.
      - 5) Sizes and location of concrete pads and bases.
    - b. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
    - c. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
    - d. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, and other ceiling mounted devices.
- G. Record Documents
  1. Prepare record documents in accordance with the requirements in Division 1. In addition to the requirements specified in Division 1, indicate installed conditions for:

- a. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
  - b. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
  - c. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
2. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located to record the locations and invert elevations of underground installations.

H. Operation and Maintenance Manuals

- 1. Prepare maintenance manuals in accordance with Division 1. Compile and assemble the operation and maintenance data of equipment specified in Division 26 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference. Data shall clearly indicate only provided options and accessories.
- 2. In addition to the requirements specified in Division 1, include the following information for equipment items:
  - a. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - b. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - d. Servicing instructions and lubrication charts and schedules.
  - e. Spare parts list as required by individual Division 26 sections.

1.05 JOB CONDITIONS

- A. Coordination. Coordinate with other trades to prevent delays, omissions, or errors.
- B. Scheduling. It is mandatory that the facility be maintained in operation during construction and that periods of shutdown due to "line changeovers," etc., are held to a minimum. These outages must be scheduled with and have the concurrence of the Engineer/Architect and the Owner. Further, it is mandatory that the completion of various stages of the electrical work coincide with the other phases of construction to maintain present and permit operation of new installations as construction progresses.
- C. Controls and Wiring. Controls and wiring shall be furnished and installed as specified under the electrical contract based on the ratings and horsepower shown on the plans. The general, heating, ventilating, and air conditioning (HVAC), and plumbing contractors shall verify the rating and horsepower of the equipment they propose to furnish and shall provide for any necessary electrical changes to accommodate the equipment furnished at no change in contract price.

- D. Controls and Wiring. The Contractor shall verify the rating and the horsepower of the equipment he proposes to furnish and shall provide for any necessary electrical changes to accommodate the equipment furnished at no change in contract price.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery. Deliver products to the project identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

#### 1.07 SPECIAL WARRANTY

- A. General. Compile and assemble the warranties specified in Division 26 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference.
  - 1. Provide complete warranty information for each item. Information to include:
    - a. Product or equipment list.
    - b. Date of beginning of warranty or bond.
    - c. Duration of warranty or bond.
    - d. Names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

#### 1.08 DEFINITIONS

- A. Finished Areas. In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.
- B. Interior. For the purposes of this specification, interior is any area within the boundaries of the foundation of any building or within the superstructure of other structures not classified as a building.
- C. Hazardous (Classified) Areas. Hazardous (classified) areas are designated on the drawings in conformance with the NEC. All equipment and the installation shall conform to requirements for installation in the designated hazardous area as described in Articles 500, 501, 502, and 504 of the NEC.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### 3.01 EXAMINATION

- A. General. Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
  - 1. Coordinate electrical systems, equipment, and materials installation with other building components.
  - 2. Verify all dimensions by field measurements.
  - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.

#### 3.02 PREPARATION

- A. Rough-In
  - 1. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.



2. Refer to equipment specifications specified elsewhere for rough-in requirements.
- B. Coordination
1. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.
  2. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service and place each in proper operating order.
  3. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.
- C. Clearance. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

### 3.03 INSTALLATION

- A. General. Install systems, materials, and equipment to conform with submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer/Architect before final placement.
1. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
  2. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
  3. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 8.
  4. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
- B. Temporary Electric. The Contractor shall furnish, install, maintain, and remove the temporary electrical power and lighting systems, including temporary service equipment, wiring, portable generator sets, etc. as shown on the drawings and specified herein and pay for all labor, materials, and equipment as required to maintain full operation of the facilities during construction.
- C. The Contractor shall make all necessary arrangements with the local utility company as to where the temporary electric service can be obtained
- D. The Contractor shall secure and pay for all required permits and back charges for work performed by others, and other expenses incidental to the installation of the temporary electric service.
- E. The Contractor shall be responsible to pay for temporary generator sets including the required fuel.
- F. All such temporary electrical work shall meet the requirements of the National Electrical Code, the local utility company, and OSHA. Locate temporary services and facilities where

they will serve the project adequately and result in minimum interference with the work. Connect the service to the local utility company's temporary power source in the manner directed by the utility company officials. Install temporary lighting to fulfill security and protection requirements, without having to operate the entire temporary lighting system. Inspect and test the temporary electric service before placing in use. Arrange for inspections and test and obtain permits for use. Provide temporary electrical connections when first needed to avoid delay in the work. Maintain, expand, and modify temporary connections as needed. Remove temporary electrical service and connections promptly when need has ended, or when replaced by use of a permanent facility. Complete, or if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces, and replace work which cannot be repaired. At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

### 3.04 CUTTING AND PATCHING

- A. General. Perform cutting and patching in accordance with the General Conditions and the following requirements:
1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
    - a. Uncover work to provide for installation of ill-timed work.
    - b. Remove and replace defective work.
    - c. Remove and replace work not conforming to requirements of the Contract Documents.
    - d. Remove samples of installed work as specified for testing.
    - e. Install equipment and materials in existing structures.
    - f. Upon written instructions from the Engineer/Architect, uncover and restore work to provide for the Engineer/Architect observation of concealed work.
  2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including, but not limited to, removal of electrical items indicated to be removed and items made obsolete by the new work. Existing electrical items not indicated to be reused are to be removed.
  3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
  4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
  5. Patch new or existing finished surfaces or building components which are disturbed by electrical installations. Use new matching materials.
- B. Openings, Penetrations, and Inserts. Provide all openings required for the work. Make penetrations through walls and floors by core drilling. Seal openings after the installation of raceways, wire, or cable as specified in Section 26 05 29.
1. Core drill with the required size drill. Visually inspect the opposite side of the wall or the floor prior to drilling to verify that utilities and other in-place items will not be damaged by drilling operations. Rope off areas on the floor below the drilling location and post required warning signs.
  2. Drilled penetrations shall be of adequate size to permit installation of seals in the space between penetrating items and core sides, and the spaces between penetrating items.

3. All chases, sleeves, inserts for hangers, supports, and fastenings should be located in advance of new construction in order to minimize interferences.

### 3.05 ELECTRICAL DEMOLITION

#### A. Existing Conduit Location

1. In existing structures at this project, there is electrical conduit embedded in concrete. It shall be the responsibility of the Contractor, under this section, to attempt to locate and mark the existence of any conduit embedded in areas where, as part of this Contract, the concrete is to be drilled or cut into for any purpose.
2. Contractor shall use every available means possible to attempt to locate existing conduit. Whenever a hole is to be cut into an existing slab, wall, or other structural concrete, that area shall be X-rayed prior to drilling to show the locations of conduits and resteel.

#### B. Removal and Relocation of Existing Electrical Apparatus

1. The Contractor, under this section, shall remove and store or relocate all existing electrical apparatus as shown on the drawings, as specified herein, or as necessary for the completion of this Contract except where specifically called for to be included under another section of the Contract. The Contractor shall be responsible for verifying existing conditions, dimensions, locations, quantities, etc., associated with the removal and relocation of electrical apparatus. In addition, the Contractor shall be responsible for verifying and identifying the existing circuits associated with the removal and relocation of electrical apparatus. Failure of the Contractor to review the Contract Documents and verify the existing conditions shall not be sufficient cause to warrant a change in contract after contract award.
2. Where existing electrical equipment, including lighting fixtures, is shown to be removed, the Contractor shall also remove the existing branch wiring.
  - a. Wiring removal shall extend to the branch disconnect or to the next piece of utilization equipment.
  - b. Where new or existing equipment is to be reinstalled, the wiring shall be temporarily terminated.
3. Where part of the existing equipment on a branch circuit is to be disconnected, the circuit shall be de-energized only long enough to disconnect the equipment and terminate the wiring that is to remain.
4. All equipment and major lengths of wiring retired and removed shall remain the property of the Owner unless shown or directed otherwise and shall be placed in storage on the site by the Contractor where ordered.
5. When pumps, motors, or other apparatus are being removed under other sections of this Contract, all electrical wiring, conduit, boxes, and related equipment shall be completely removed under Division 26.
6. Removal of all equipment shall include the removal of all accessories incidental to the major units. Where wiring is removed from conduit and boxes, the accessible conduit and boxes shall also be removed.
7. When the Contract is complete, no piece of electrical equipment shall remain installed that is not in service unless otherwise ordered.

8. Where electrical conduit, boxes, or appurtenances are embedded in walls or slabs, and wires, wiring devices, fixtures, or other apparatus is removed from these embedded items, the conduits shall be cut off flush with the surface and plugged with masonry to a smooth surface and the boxes and other appurtenances covered with suitable approved stainless steel cover plates. The cover plates shall have stainless steel fasteners.
9. Electrical equipment or components, supported by materials or equipment being removed under this or other Divisions in this Contract, shall be temporarily supported during the demolition process and then properly and permanently resupported prior to the conclusion of this Contract. All supports shall meet all the applicable requirements of this Division.
10. Any electrical equipment or components damaged during the performance of this Contract shall be replaced or repaired to a "like new" condition in accordance with the requirements of this Division.

### 3.06 CLEANING

- A. General. When all work is completed and has been tested and accepted by the Engineer/Architect, the Contractor shall clean all light fixtures, equipment, and exposed surfaces that have been directly affected by this work. The Contractor, insofar as the work is concerned, shall at all times keep the premises in a neat and orderly condition and at the completion of the work shall properly clean up and remove from the site any excess materials.

### 3.07 DEMONSTRATION

- A. General. The Contractor shall perform a 14-day operational demonstration of the complete electrical system. The 14-day operational demonstration shall not begin until all field tests are completed and all problems and defects encountered during the field test have been corrected.
- B. System Acceptance. System acceptance beyond the level of Substantial Completion shall not occur until the entire electrical system has performed as a functioning unit continuously for 30 consecutive days. Failure of any component or required feature shall require a restart of the 14-day operational demonstration until 30 consecutive days of continuous operation have been completed.
- C. Staffing. Provide the services of qualified service technician for the duration of the 14-day operational demonstration.

END OF SECTION

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## SECTION 26 00 02

### BASIC ELECTRICAL MATERIALS AND METHODS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 02 41 00, "Demolition."
  - 2. Section 31 23 34, "Excavation, Backfill, and Embankment."
  - 3. Section 03 30 00, "Cast-in-Place Concrete."
  - 4. Section 26 00 01, "Basic Electrical Requirements."

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to provide basic electrical materials in accordance with the plans and as specified herein.
- B. Applications. This section includes limited scope general construction materials and methods for application with electrical installations as follows:
  - 1. Excavation for underground utilities and services, including underground raceways, vaults, and equipment.
  - 2. Miscellaneous metals for support of electrical materials and equipment.
  - 3. Wood grounds, nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment.
  - 4. Concrete used for outdoor equipment pads, pole base foundations, pipe supports, and housekeeping pads for all floor-mounted equipment including but not limited to motor control centers, switchboards, and transformers, and freestanding motor controllers, switches, circuit breakers, and custom panels.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with basic electrical materials in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein. Where provisions of the pertinent codes and standards conflict with this specification, the more stringent provision shall govern.
  - 1. American Institute of Steel Construction (AISC) "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings."
  - 2. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
  - 3. National Electrical Code (NEC).
- B. Qualifications
  - 1. Installer Qualifications. Engage an experienced installer for the installation.
  - 2. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel."

- a. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

#### 1.04 SUBMITTALS

- A. Shop Drawings. Shop drawings detailing fabrication and installation for metal fabrications and wood supports, and anchorage for electrical materials and equipment.
- B. Certificates. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this section.

#### 1.05 JOB CONDITIONS

- A. Coordination. Coordinate with other trades to prevent delays, omissions, or errors.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling. Store and handle materials in compliance with the manufacturer's recommendations to prevent their deterioration and damage.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Miscellaneous Metals and Reinforcing Materials
  - 1. Provide steel plates, shapes, bars, and bar grating conforming to American Society for Testing and Materials (ASTM) A 36.
  - 2. Provide cold formed steel tubing conforming to ASTM A 500.
  - 3. Provide hot rolled steel tubing conforming to ASTM A 501.
  - 4. Provide steel pipe conforming to ASTM A 53, Schedule 40, welded.
  - 5. Provide nonshrink, nonmetallic grout which is premixed, factory packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.
  - 6. Provide fasteners which are zinc-coated, type, grade, and class as required.
  - 7. Provide deformed reinforcing bars conforming to ASTM A 615, Grade 40 or 60, unless otherwise indicated.
  - 8. Provide reinforcing materials with size and placement as shown on the plans.
  - 9. Provide welded wire fabric conforming to ASTM A 185.
- B. Miscellaneous Lumber
  - 1. Provide framing materials which are Standard Grade, light framing size lumber of any species. Number 3 Common or Standard Grade boards complying with West Coast Lumber Inspection Bureau (WCLIB) or American Wood Preservers Association (AWPA) rules, or Number 3 boards complying with Southern Pine Inspection Bureau (SPIB) rules. Lumber shall be preservative treated in accordance with AWPA LP-2 and kiln dried to a moisture content of not more than 19 percent.
  - 2. Provide construction panels which are plywood panels; American Plywood Association (APA) C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less than 15/32 inch.
- C. Concrete

1. Provide concrete as specified in Section 03 30 00, "Cast-in-Place Concrete."

### **PART 3 - - EXECUTION**

#### **3.01 EXAMINATION**

- A. General. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
  1. Field-verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and regulations, the Contract Documents, and the referenced standards.
  2. The work shall be carefully laid out in advance, and where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary for the proper installation, this work shall be carefully done, and any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
  3. In the event any discrepancies are discovered, immediately notify the Engineer/Architect in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

#### **3.02 EXCAVATION**

- A. General. Perform excavation in accordance with Section 31 23 34, "Excavation and Backfill," and in accordance with any local codes and ordinances.

#### **3.03 ERECTION**

- A. Erection of Metal Supports and Anchorage
  1. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
  2. Provide field welding which complies with AWS "Structural Welding Code."
- B. Erection of Wood Supports and Anchorage
  1. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
  2. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
  3. Attach to substrates as required to support applied loads.

#### **3.04 INSTALLATION**

- A. Concrete. Install concrete in accordance with Section 03 30 00, "Cast-in-Place Concrete," and in accordance with the plans and as specified herein.
  1. Strength, Spacing, and Placement of Equipment Housekeeping Pads. Provide a housekeeping pad for all floor mounted equipment unless noted otherwise. Fabricate pad as follows:
    - a. Coordinate size of housekeeping pad with actual equipment provided. Fabricate base 4 inches larger in both directions than the overall dimensions of the supported equipment.



- b. Form concrete pads with framing lumber with form release compounds. Provide 1-inch chamfer on top edge and corners of pad.
- c. Install reinforcing bars and place anchor bolts and sleeves to facilitate securing equipment.

END OF SECTION

## SECTION 26 05 12

### WIRE, CABLES, AND CONNECTORS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 23, "Communication and Signal Cables."
  - 4. Section 26 05 34, "Cabinets, Boxes, and Fittings."

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to install wires, cables, and connectors in accordance with the plans and as specified herein.
- B. Miscellaneous. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with wires, cables, and connectors in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. National Fire Protection Association (NFPA) 70, "National Electrical Code (NEC)."
  - 2. Underwriters' Laboratories, Inc. (UL) Compliance. Provide components which are listed and labeled by UL under the following standards.
    - a. a.UL Standard 83Thermoplastic Insulated Wires and Cables.
    - b. b.UL Standard 486AWire Connectors and Soldering Lugs for Use with Copper Conductors.
    - c. c.UL Standard 854Service Entrance Cable.
  - 3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA) Compliance. Provide components which comply with the following standards:
    - a. WC-70Nonshielded 0-2 kV Cables.
  - 4. Institute of Electrical and Electronics Engineers (IEEE) Compliance. Provide components which comply with the following standards:
    - a. Standard 82Test Procedure for Impulse Voltage Tests on Insulated Conductors.

##### 1.04 SUBMITTALS

- A. General. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Submittals. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:

1. Product data for electrical wires, cables, and connectors.
2. Product data for Megger insulation testing instrument.
3. Report sheets for Megger testing.

1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wire and cable properly packaged in factory-fabricated-type containers, or wound on NEMA specified type wire and cable reels.
- B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. Handle wire and cable carefully to avoid abrading, puncturing, and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

1.07 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MATERIALS

A. Wires and Cables

1. Provide electrical wires and cables of manufacturer's standard materials as indicated by published product information designed and constructed as recommended by manufacturer for a complete installation, and for application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98 percent at 20 degrees Celsius ( $^{\circ}$  C.) (68 degrees Fahrenheit [ $^{\circ}$  F.]).
2. Provide factory fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, and NEC and NEMA standards. Select from the following UL types those wires with construction features which fulfill project requirements:
  - a. Provide Type RHW-2 for dry and wet locations, temperature rating  $90^{\circ}$  C. ( $194^{\circ}$  F.). Insulation, flame-retardant, moisture-resistant thermoset; conductor, annealed copper.
  - b. Provide Type XHHW-2 for dry and wet locations, temperature rating  $90^{\circ}$  C. ( $194^{\circ}$  F.). Insulation, flame-retardant, moisture-resistant thermoset; conductor, annealed copper.
  - c. Provide Type THWN-2 for dry and wet locations; temperature rating  $90^{\circ}$  C. ( $194^{\circ}$  F.). Insulation, moisture- and heat-resistant, flame-retardant thermoplastic; conductor, annealed copper.
  - d. Provide Type USE-2 for dry and wet locations; temperature rating  $90^{\circ}$  C. ( $194^{\circ}$  F.). Insulation, moisture and heat resistant; conductor annealed copper.
3. Provide color coding for phase identification in accordance with requirements in Section 26 05 53, "Electrical Identification."
  - a. Wiring and identification for emergency systems shall be in compliance with NEC Article 700-9.
4. Conductor stranding shall be as follows:

AWG kcmil	Strands (RHW/THW)	Strands (XHHW)	Strands (THWN/THHN)
No. 14 to No. 10	1	7	1
No. 8 to No. 2	7	7	19
No. 1 to No. 4/0	19	19	19
250 to 500	37	37	37
600 and above	61	61	61

B. Variable-Frequency Drive (VFD) Cables

1. Material. Conductors shall be annealed copper, conforming to American Society for Testing and Materials (ASTM) B 3 and B 8 and have cross-linked polyethylene (XLPE) insulation, meeting the requirements of UL Standard 44, suitable for use in wet and dry locations at a conductor temperature not exceeding 90° C.
2. Conductor insulation thickness shall be at least 0.045 inches for No. 12 and No. 10 AWG conductors and 0.060 inches for No. 8 through No. 2 AWG conductors.
3. Ground conductors shall be cabled with either one full-size insulated conductor or three bare conductors. Where three conductors are used, the sum of the cross sectional areas of the ground conductors shall be equal to, or greater than, that of an equipment ground conductor sized according to NEC Table 250.122 for the overcurrent device as shown on the contract drawings protecting the VFD cable.
4. Conductors shall be provided with either an overall aluminum foil 100 percent shield covered by a tinned copper braid shield or a 5-mil-thick copper tape corrugated and longitudinally applied with a minimum overlap of 15 percent to form a 100 percent shield.
5. The cable shall be provided with an overall polyvinyl chloride (PVC) jacket, UL 1277 listed as Type TC, Tray Cable.

C. Connectors and Terminals

1. General. Provide UL-type factory-fabricated metal connectors and terminals of sizes, ampacity ratings, materials, types, and classes indicated.
2. Twist-on Connectors. Conforming to UL 486 C consisting of a tapered spring with insulated outer covering.
3. Compression Connectors. Tin plated copper. Configuration shall be tee, in-line, etc., as required.
4. Terminals. Tin plated copper, compression locking fork tongue with insulated barrel.
5. Compression Lugs. Tin-plated copper, standard barrel, one hole or two hole as required.
6. Pin Terminators. Tin plated copper, compression, for wire sizes No. 18 American Wire Gauge (AWG) to No. 8 AWG.
7. Heat-Shrink Insulation. Heat-shrinkable polyolefin with an internally applied adhesive watertight sealant.
8. Motor Connection Kit. Consisting of compression lugs bolted together, cloth tape cover, and heat shrink insulation.

9. Splice Kit. Consisting of compression connector and heat-shrink insulation.

## 2.02 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  1. Wire and Cable.
    - a. Southwire Company.
    - b. General Cable Co
    - c. Rome Cable Corp.
    - d. American Insulated Wire Corp.
  2. VFD Cable.
    - a. Belden.
    - b. Tamaqua Cable Products Corp.
    - c. Or equal.
  3. Connectors and Terminals for Wires and Cable Conductors.
    - a. AMP.
    - b. Burndy Corporation.
    - c. Grafoplast Wiremarkers, Inc.
    - d. Ideal Industries, Inc.
    - e. 3M Company
    - f. O-Z/Gedney Co.
    - g. Raychem.
    - h. Square D Company.
    - i. Thomas and Betts Corp.

## PART 3 - EXECUTION

### 3.01 WIRE AND CABLE INSTALLATION

- A. Uses Permitted
  1. Install UL-Type RHW-2 cable in conduit for service entrance and distribution power feeders from service entrance switchboard to Motor Control Centers and main distribution panels. Cable shall be rated for cable tray use where applicable.
  2. Install UL-Type THWN-2 cable in conduit, for branch circuits, for panel-board feeder circuits, motor branch circuits, lighting, receptacles, and interior control and metering circuits.
  3. Install VFD cables between VFDs and motors.
  4. UL-Type MTW cable acceptable for use in control panels.
- B. Install electrical cables, wires, and connectors in compliance with NEC.
- C. Coordinate cable installation with other work.

- D. Pull conductors simultaneously where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.
- E. Use pulling means including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.
- F. Conceal all cable in finished spaces.
- G. Install exposed cable parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.
- H. Power conductors shall be No. 12 AWG minimum. Control conductors may be No. 14 AWG where circuit amperes and the NEC allow and when length does not pose a voltage drop problem.
- I. Conductors shall be sized such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.
- J. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- K. Install a maximum of three lighting circuits or three 20-ampere, 120-volt general-use receptacle circuits per conduit. Install all other branch circuits and feeders in separate conduits unless otherwise noted.
- L. Provide a separate neutral for every branch circuit.

### 3.02 CONNECTOR, TERMINAL, AND SPLICE INSTALLATION

- A. Uses Permitted
  - 1. Install twist-on connectors for lighting, communication, and receptacle branch circuits and utilization equipment only in size No. 8 AWG and smaller and only in finished areas.
  - 2. Install fork tongue terminals on control and metering conductors which connect to terminal blocks.
  - 3. Install motor connection kits on all polyphase induction motors.
  - 4. Install compression connectors and lugs for all other connections.
- B. Service entrance conductors and feeders shall be installed without splices. Electrical equipment feeders shall be spliced only where shown or specifically approved. Splices in electrical manholes or handholes shall not be allowed. Control and metering conductors shall be installed without splices.
- C. Install all compression connectors, splices, and lugs with a ratcheting tool which will not release until proper compression is achieved.
- D. Splices where permitted shall possess equivalent-or-better mechanical strength and insulation ratings than conductors being spliced. Use splice and tap connectors which are compatible with conductor material.
- E. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

### 3.03 FIELD QUALITY CONTROL

- A. The Contractor shall test each electrical circuit after permanent cables are in place with terminators installed, but before cable or wire is connected to equipment or devices to demonstrate that each circuit is free from improper grounds and short circuits.
- B. The Contractor shall test by Megger test, the insulation resistance between phases and from each phase to ground for each of the following feeder and motor branch circuits:
  - 1. Motor control centers.
  - 2. Panelboards.
  - 3. Switchboards.
  - 4. Switchgear.
  - 5. Motors.
- C. Measure the insulation resistance at 500 volts direct current (dc) with a hand cranked or motor driven "Megger" insulation testing instrument. Battery operated test instruments are not permitted. All test instruments are to be provided by the Contractor.
- D. If any insulation resistance measures less than 50 megohms, the cable shall be considered faulty with the cable failing the insulation test. In moist environments, bag the ends of the cable to prevent a faulty Megger test.
- E. Any cable which fails the insulation tests or which fails when tested under full load conditions shall be replaced with new cable for the full length and retested. Corrective action and repeated tests shall be accomplished at the Contractor's own expense.
- F. Maintain testing report sheets identifying each cable tested, what each feeder or motor branch circuit will be connected to, and the level of insulation resistance measured. Test reports shall be signed by the tester, initialized by the Engineer and sent to the Engineer within 48 hours.
- G. Every below grade service or feeder splice shall be water-immersion Megger tested. Each splice shall be immersed in a grounded water immersion bath for 24 continuous hours prior to and during the test. Criteria for failure shall be as described for cable above.

END OF SECTION

**SECTION 26 05 13**  
**MEDIUM VOLTAGE POWER CABLE**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, and materials necessary to furnish and install medium voltage electrical power cable in accordance with the plans and as specified herein.
  - 1. Extent of electrical power cable work is indicated by drawings and schedules.
  - 2. Types of electrical power cable and connectors specified in this section include the following:
    - a. Single Conductor Cable.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. Electrical Power Cables
  - 1. Manufacturers. Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and rating required, whose products have been in satisfactory use in similar service for not less than 5 years.
  - 2. Installer's Qualifications. Firm with at least 3 years of successful installation experience with projects utilizing electrical wiring and cabling work similar to that required for this project.
  - 3. National Electrical Code (NEC) Compliance. Comply with NEC Article 326 and 318 for tray cable requirements as applicable to construction, installation, and color coding of electrical power cables.
  - 4. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with applicable requirements of UL Standard 83, "Thermoplastic Insulated Wires and Cables," and shall be listed by UL as Type MV-90.
  - 5. Insulated Cable Engineers Association, Inc. (ICEA) Compliance. Comply with physical and electrical requirements of ICEA Standard S-66-524 for a filled insulation.
  - 6. Association of Edison Illuminating Companies (AEIC) Compliance. Shall meet or exceed the qualification test requirements of AEIC CS-5 and AEIC CS-6.



7. Institute of Electrical and Electronic Engineers (IEEE) Compliance. Fully comply with testing provisions of IEEE Standard 323-1974 and 383-1974 for insulation thickness and color coding.
- C. Electrical Power Cable Connections
1. NEC Compliance. Connections, terminals, and splices shall comply with applicable provisions of NEC Article 110 through 114 and shall be UL listed and labeled.
  2. Electrical Testing Laboratories, Inc. (ETL) Compliance. Connections, terminals, and splices shall be ETL listed and labeled.
  3. National Electrical Manufacturers Association (NEMA)/ICEA Compliance. (WC7/5-66-524 Cross Linked Thermosetting Polyethylene to 35 kV) insulated wire and cable for the transmission and distribution of electrical energy.
  4. American Society for Testing and Materials (ASTM) Compliance. Comply with applicable requirements of ASTM D 1248, Type 1, Class B, Category 5, Grades 84 and 85 for copper electrical wire.

#### 1.04 SUBMITTALS

- A. Transmittals. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Product Data. Submit manufacturer's data on electrical power cables and connectors.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver power cables properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.
- B. Store power cables in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. Handle power cable carefully to avoid abrading, puncturing, and tearing cable insulation and sheathing. Ensure that dielectric resistance integrity power/cables is maintained.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Manufacturers
  1. Manufacturers. Subject to compliance with requirements, provide medium voltage power cables and connectors of one of the following (for each type of wire, cable, and connector):
    - a. Wire and Cable (5KV).
      - 1) Aetna Insulated Wire Company.
      - 2) American Insulated Wire Corp.
      - 3) American Wire and Cable Company (to 15 kV).
      - 4) Brand-Rex Division, Pyle National Company (to 15 kV).
      - 5) Cerro Wire and Cable Corporation.
      - 6) General Cable Corporation.

- 7) Helix Wire Corporation.
  - 8) Okonite Company.
  - 9) Phelps Dodge Cable and Wire Company.
  - 10) Pirelli Cable Corporation.
  - 11) Radix Wire Company.
  - 12) Rome Cable Corporation.
  - 13) Triangle PWC, Incorporated.
  - 14) Hendrix
- b. Connectors.
- 1) AMP, Incorporated.
  - 2) Burndy Corporation.
  - 3) Brand-Rex Division, Pyle National Company.
  - 4) Electrical Products Division, Midland-Ross Corporation.
  - 5) General Electric Company.
  - 6) Ideal Industries, Incorporated.
  - 7) 3M Company.
  - 8) O-Z/Gedney Company.
  - 9) Thomas and Betts Corporation.

B. Power Cables and Connectors (5KV)

1. Provide electrical power cables and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a complete installation, and for application indicated. Except as otherwise indicated, provide copper conductors with maximum resistance values based upon ASTM Specification B3 for annealed copper. Resistivity to be 891.58 pound/mile-ohm with the equivalent IACS percent conductivity of 98.16.
2. Provide UL type factory fabricated cables of sizes, ampacity ratings, and materials and jacketing/sheathing as indicated for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements, NEC, and NEMA standards. Select from the following types, those cables with construction features which fulfill project requirements.
3. Individual Power Cable Construction.
  - a. Conductors. Annealed stranded bare copper.
  - b. Conductor Shield. Extruded thermosetting polyethylene layer.
  - c. Insulation. Thermosetting, expanded cross linked polyethylene.
  - d. Insulation Shield. Nonmetallic component shall consist of a semiconducting film over the insulation wrapped with semiconducting tape. Metallic component shall consist of bare copper wires helically applied.
  - e. Jacket. Shall be heat, oil, acid, and sunlight resistant polyvinyl chloride.
  - f. Cable Insulation Level. 133 percent as defined by AEIC.

- g. Cable Identification. Cables shall be identified on the exterior jacket by printing the cable conductor size, voltage class ground wire size, insulation thickness, MV-90, with the manufacturer's name and product identification.
4. Connectors.
- a. General. Provide UL type factory fabricated, metal connectors of sizes, ampacity ratings, materials, types, and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NEC, and NEMA standards. Select from the following those types, classes, kinds, and styles of connectors to fulfill project requirements.
    - 1) Type. Bolted pressure.
    - 2) Class. Noninsulated.
    - 3) Kind. Copper (for Cu to Cu connection).
    - 4) Kind. Aluminum-copper (for Al to Cu connection).
    - 5) Style. Terminator.
    - 6) Style. Splice.
    - 7) Style. T splice.
    - 8) Style. Terminal.

### **PART 3 - EXECUTION**

#### **3.01 WIRES AND CABLES**

- 1. General. Install electrical power cables and connectors as indicated in compliance with applicable requirements of NEC, NEMA, UL, and National Electrical Contractors Association's (NECA) "Standard of Installation," and in accordance with recognized industry practices.
- 2. Coordinate power/cable installation work including electrical raceway and equipment installation work as necessary to properly schedule installation of power/cables with other work.
- 3. Submittal. Submit record drawings showing the locations of all power cables.
- 4. Personnel. Use experienced personnel familiar with the materials and procedures to be employed for power/cable installation.
- 5. Splices and Terminations. Shall be in strict accordance with the cable manufacturer's recommendations and shall be watertight below grade in all manholes and pull boxes. All splices shall be made only by specific permission of the Engineer/Architect. Outdoor terminations shall utilize watertight terminating insulators. Indoor terminations shall utilize waterproof heatshrink to prevent moisture entry between insulating systems.
- 6. Pulling. Pull power cables simultaneously where more than one cable is being installed in a raceway and use pulling means and grips that will not damage the cables or raceway.
- 7. Pulling Tension. Shall be within the limits recommended by the cable manufacturer and a dynamometer shall be employed to monitor the pulling tension when mechanical pulling means are employed.

8. Pulling Compound. Shall be insulating type containing no mineral oil or soap. Shall be compatible with the power cable components.
9. Cable Ends. Shall be cut off where mechanical pulling means have been used and the cable ends shall be sealed until final terminations are made.
10. Bending Radius. Shall be limited to a minimum of eight times the power cable overall diameter.
11. Slack. Maximum slack shall be provided at all terminal points.
12. Fireproofing. Wrap power cables with fireproofing, self-extinguishing tape within all manholes or pull boxes. Tape shall not support combustion and shall be resistant to water, salt, sewage, and fungus.
13. Raceways for power cable shall be installed parallel and perpendicular to surfaces or exposed structural members and shall follow contours where possible.
14. Testing. All medium voltage cable shall be highpot tested in accordance with the AEIC latest applicable issue, section titled "Acceptance Testing." The test shall require high voltage direct current (dc) to be applied at 1 kilovolt (kV) per second until the acceptance voltage is reached (approximately 250 percent of cable rating). The test voltage shall be maintained for 15 consecutive minutes. Current flow in amperes shall be logged at 15 second intervals up to 1 minute and at 1 minute intervals thereafter. Each cable test shall be signed and dated by the tester and submitted to the Engineer/Architect for approval before it is energized. The Contractor shall provide a graphic plot of the leakage current versus voltage predicted for each cable prior to the highpot test. Actual test results shall be plotted on this predicted graph. Carefully dry and bag all exposed cable ends during testing.
15. Maximum leakage current should not exceed:
 
$$I_L = E \div (K \text{ LOG } D/d)$$
 Furnish the following data prior to testing:  
 Length of cable.  
 K = insulation specific resistance Megohm/Mft at 60° F.  
 D = diameter over insulation.  
 d = diameter under insulation.  
 E = maximum test voltage.
16. Test Acceptance or Rejection. The Engineer/Architect shall determine acceptance or rejection. New power cable failing the test shall be replaced and retested until the cable satisfactorily passes the test.

END OF SECTION

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**SECTION 26 05 23**  
**COMMUNICATION AND SIGNAL CABLES**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 12, "Wires, Cables, and Connectors," for ordinary building wire that may sometimes be used for control or signal circuits.
  - 4. "Optical Fiber Cabling Systems," for systems such as telephone, television, and data transmission using fiber-optic cable.

**1.02 DESCRIPTION OF WORK**

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install communication and signal cables in accordance with the plans and as specified herein.
- B. Cables and Accessories. This section includes cables and connectors designed for and used in communication, control, data, and signal circuits including:
  - 1. Twinaxial cable.
  - 2. Shielded twisted pair cable.
  - 3. Unshielded twisted pair cable.
  - 4. Coaxial cable connectors.
  - 5. Signal cable terminals.

**1.03 QUALITY ASSURANCE**

- A. Codes and Standards. Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. Connected Equipment Manufacturer Approval. Where cables specified in this section are used to provide signal paths for systems specified in other sections of these specifications or for systems furnished under other contracts, obtain review of the cable characteristics and approval for use with the connected system equipment by the connected equipment manufacturers.
- C. Electrical Component Standard. Provide work complying with applicable requirements of National Fire Protection Association (NFPA) 70, "National Electrical Code (NEC)," and NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."
- D. National Electrical Manufacturer's Association/Insulated Cable Engineers Association (NEMA/ICEA) Compliance. Comply with NEMA/ICEA Standard Publication WC 70,

“Nonshielded 0-2 kV Cables”; and WC 63.2, “Performance Standard for Coaxial Premise Data Communications Cables”.

- E. American Society for Testing and Materials (ASTM) Compliance. Comply with applicable requirements of ASTM B 1, B 2, B 3, B 8, B 33, D 2219, and D 2220. Provide copper conductors with conductivity of not less than 98 percent at 20 degrees Celsius (° C.) (68 degrees Fahrenheit [° F.]).
- F. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with applicable requirements of UL Standard 83, "Thermoplastic-Insulated Wires and Cables"; and UL 486 A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide products that are UL listed and labeled.
- G. MIL-SPEC Compliance. Comply with MIL-C-3093, "Telephone Cable; Inside Distribution Wiring," MIL-C-55021, "Twisted-Pair and Triplet Cables; Hookups General Specifications," MIL-C-17/28, "Radio Frequency Flexible Coaxial Cables, 50 Ohms," and MIL-C-17/29, "Radio Frequency Flexible Coaxial Cables, 75 Ohms."

#### 1.04 SUBMITTALS

- A. General. Furnish manufacturer's product data, test reports, and material certifications as required.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wire and cable properly packaged in factory-fabricated-type containers, or wound on NEMA-specified-type wire and cable reels.
- B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. Handle wire and cable carefully to avoid abrading, puncturing, and tearing wire, cable insulation, and sheathing. Ensure that dielectric resistance and characteristic impedance integrity of the cable are maintained.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. General. Provide communication and signal cables of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by manufacturer, for a complete installation and for applications indicated.

#### 2.02 SIGNAL CABLES

- A. 300-Volt Rated Single Pair. Shielded twisted pair cable, 18 American Wire Gauge (AWG), stranded- (tinned-) copper conductors, polyvinyl chloride (PVC) insulation, aluminum type shield, tinned copper drain wire, ultraviolet (UV) stabilized PVC jacket, 300-volt rated. UL listed as power limited tray cable. 100 percent shield coverage.
- B. 300-Volt Rated Multiple Pair. Multiple shielded twisted pairs as described above with an overall shield and UV stabilized PVC jacket, 300 volt rated. UL-listed as power limited tray cable.
- C. 600-Volt Rated Single Pair. Shielded twisted pair cable, 18 AWG, stranded (tinned) copper conductors, PVC insulation, aluminum type shield, tinned copper drain wire, UV stabilized

PVC jacket, 600 volt rated. UL listed as tray cable. 100 percent shield coverage. Suitable for direct burial.

- D. 600-Volt Rated Multiple Pair. Multiple shielded twisted pairs as described above with an overall shield and UV stabilized PVC jacket, 600 volt rated. UL listed as tray cable. Suitable for direct burial.

#### 2.03 TELEPHONE CABLES

- A. Nonplenum. Four pair unshielded, Category 3, 24 AWG, stranded copper with PVC insulation and PVC jacket. Cable shall be UL listed, Occupational Safety and Health Administration (OSHA) acceptable, and rated VW-1 (passes the VW-1 flame test).

#### 2.04 TWIN AXIAL CABLES

- A. Balanced pair twin axial cable, 125-ohm characteristic impedance, with 16-gauge soft drawn bare copper conductors twisted to form pairs; core insulation, expanded polyethylene; covered with copper shielding tape and with expanded polyester film.

#### 2.05 TWIN LEAD CABLES

- A. Bare copper-covered steel, two-conductor parallel, 300-ohm characteristic impedance, polyethylene insulation and web between conductors, cellular polyethylene oval jacket.

#### 2.06 CONNECTORS AND TERMINALS

- A. Coaxial Cable Connectors. Provide radio frequency, Type F cable connectors for RG-59/U flexible coaxial video cable.
- B. Provide terminals for signal cable as specified in Section 26 05 12, "Wires, Cables, and Connectors."

#### 2.07 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering control/signal cabling products that may be incorporated in the work include but are not limited to the following:
  - 1. Cables.
    - a. Alpha Communications.
    - b. American Insulated Wire Corp.
    - c. Belden Communication Division.
    - d. Berk-Tek Company.
    - e. General Cable Corporation.
    - f. Mohawk CDT.
    - g. Phelps Dodge Corp.
    - h. Pirelli Cable Corp.
  - 2. Connectors.
    - a. Thomas & Betts Corporation.
    - b. 3M Company.



## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Examine areas and conditions under which communication and signal cables are to be installed. Notify Engineer/Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer/Architect.

### **3.02 COORDINATION**

- A. Coordinate with other work, including wires/cables, boxes, and raceways, as necessary to interface installations of communication and signal cables with other work.

### **3.03 APPLICATIONS**

- A. Use 300-volt rated single- or multiple-pair signal cables for analog direct current (dc) signals (4-20 milliampere [mA], 1-5 volt, etc.) interior to buildings and in control panels where no circuit voltage exceeds 300 volts.
- B. Use 600-volt rated single or multiple pair signal cables in all exterior or underground conduits, and in all pull boxes, control panels, or motor control centers where circuit voltages exceed 300 volts.
- C. Use nonplenum telephone cable for telephone lines installed in conduit.
- D. Use nonplenum telephone cable exposed above ceiling spaces not used as plenums.

### **3.04 INSTALLATION**

- A. General. Install communication and signal cables in accordance with manufacturer's written instructions, in compliance with NEC, and in accordance with standard industry practice.
- B. Coordinate installation with other work.
- C. Install communication and signal cables without damaging conductors, shield, or jacket. Do not, either, in handling or installation bend cable to smaller radii than minimum recommended by manufacturer. Ensure that medium manufacturer's recommended pulling tensions are not exceeded. Pull conductors simultaneously where more than one is being installed in same raceway. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cable or raceway.
- D. Install all cables in conduit.
- E. Cables shall be installed without splices.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with manufacturer's published instructions for torque tightening values.
- G. Cable Terminations. Terminate cables on numbered terminal blocks where cable terminations are made on backboards and in cabinets and outlet boxes.
- H. Wiring at Backboards and Cabinets. Install conductors parallel to and at right angles to walls. Bundle, lace, and train the conductors to terminal points with no excess. Use wire distribution spools at points where cables are fanned or conductors turned. Label each terminal.
- I. Conductor Terminations. Terminate conductors of cables on terminal blocks using tools recommended by terminal block manufacturer.

### 3.05 GROUNDING

- A. Provide equipment grounding connections for telephone systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounding.

### 3.06 FIELD QUALITY CONTROL

- A. Prior to usage, test communication and signal cables for electrical continuity and for short circuits. Test all cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts. Replace malfunctioning cable with new materials, then retest until satisfactory performance is achieved.

### 3.07 COMMISSIONING

- A. Subsequent to hookups of communication and signal cables, operate communication and signal systems to demonstrate proper functioning. Replace malfunctioning cable with new materials, and then retest until satisfactory performance is achieved.

END OF SECTION

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## SECTION 26 05 26

### GROUNDING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 12, "Wires, Cables, and Connectors."
  - 4. Section 26 05 53, "Electrical Identification."

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install grounding materials in accordance with the plans and as specified herein.
- B. Grounding. This section includes solid grounding of electrical systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this section may be supplemented in other sections of these specifications.
- C. Applications of electrical grounding and bonding work in this section include the following:
  - 1. Underground metal water piping.
  - 2. Underground metal and steel reinforced concrete structures.
  - 3. Metal building frames.
  - 4. Electrical power systems.
  - 5. Grounding electrodes.
  - 6. Separately derived systems.
  - 7. Raceways.
  - 8. Service equipment.
  - 9. Enclosures.
  - 10. Equipment.
  - 11. Lighting standards.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work to furnish and install grounding in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. Electrical Code Compliance. Comply with applicable local electrical code requirements of the authority having jurisdiction, and American National Standards

Institute/National Fire Protection Association (ANSI/NFPA) 70, "National Electrical Code" (NEC), as applicable to electrical grounding and bonding, pertaining to systems, circuits, and equipment. Comply with the latest edition of the codes listed above.

2. Underwriters' Laboratories, Inc. (UL). All grounding system components and materials for which UL maintains a testing and listing service shall be UL listed. Comply with the applicable requirements of the following UL standards:
  - a. 467, "Electrical Grounding and Bonding Equipment."
  - b. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors."
  - c. 486B, "Wire Connectors for Use with Aluminum Conductors."
  - d. 486C, "Splicing Wire Connectors."
  - e. 869, "Electrical Service Equipment."
3. ANSI/Institute of Electrical and Electronics Engineers (IEEE). Comply with applicable provisions and recommended installation and testing practices of the following ANSI/IEEE standards:
  - a. 80-1986, "IEEE Guide for Safety in AC Substation Grounding."
  - b. 81-1983, "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)."
  - c. 141-1993, "IEEE Recommended Practice for Electric Power Distribution for Industrial Plants."
  - d. 142-1991, "IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems."
4. ANSI Standard C2-1993, "National Electrical Safety Code" (NESC).

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
  1. Product data for each type of product specified.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ground wire properly packaged in factory-fabricated-type containers, or wound on National Electrical Manufacturers Association (NEMA) specified type wire reels.
- B. Store grounding materials and ground wire in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. Handle grounding wire carefully to avoid abrading, puncturing and/or tearing wire insulation. Ensure that dielectric resistance of the cable insulation is maintained.

## 1.07 SPECIAL WARRANTY (NOT USED)

### PART 2 - PRODUCTS

#### 2.01 GROUNDING CONDUCTORS

- A. General. Provide types indicated. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.
- B. Bare Conductors
  - 1. Copper Conductors. Conform to the following:
    - a. Solid Conductors. American Society for Testing and Materials (ASTM) B 3.
    - b. Assembly of Stranded Conductors. ASTM B 8.
    - c. Tinned Conductors. ASTM B 33.
- C. Insulated Conductors. Refer to Section 26 05 12, "Wires, Cables, and Connectors."
- D. Ground Bus. Bare (tin-plated), annealed, 98 percent conductivity copper bars of rectangular cross section, 1/4" x 3" x length as required. Cable lug hole spacing 2 inches center to center minimum.
- E. Braided Bonding Jumpers. Flexible, 153,700-circular-mil braid, formed with 30 AWG tin-plated copper wire and terminated with crimp-type copper connectors or ground connector for copper braid to rod or tube.
- F. Bonding Strap. Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

#### 2.02 GROUNDING ELECTRODES

- A. Ground Rods. One piece, copper clad steel with high strength steel core and electrolytic grade copper cladding 3/4" x 10'.
- B. Ground Enhancement Material. Ground enhancement material shall be permanent and maintenance-free (no recharging with salts, chemicals, or water) and shall maintain earth resistance over time. It shall set up firmly and not dissolve, decompose, or otherwise pollute the soil or water table. The ground enhancement material shall be suitable for installation in either dry or slurry form, and shall not depend on continuous presence of water to maintain conductivity. The material shall have a resistivity of less than 20 ohm-cm. Ground enhancement material shall be GEM produced by Erico Products, Inc.
- C. Enhanced Grounding Electrode. 2 inch trade size Type K copper tube, minimum 10 feet long or longer as required by the Contract Documents, straight or L-shaped as required by subgrade conditions, capped on both ends, perforated with breather holes at the top and leach holes at the bottom, and partially filled with nonhazardous metallic salts. A short length of 4/0 AWG copper cable shall be welded to the tube for connection to the grounding electrode conductor, and a U bolted pressure plate connection shall be provided just under the top cap for a test point. Product shall be listed under UL 467J and ANSI 633.8, and shall include bentonite backfill material and protective flush box with grate type lid consistent with its listing.
- D. Test Wells. Provide a 12-inch-square-by-12-3/4-inch-deep box with heavy-duty locking cover and set box flush in a 5-foot-square-by-8-inch-deep cast-in-place reinforced concrete pad having top flush with finished grade. Box and lid shall be fabricated from a material consisting of sand and gravel bound together with a polymer and reinforced with continuous woven glass strands. Material shall have a compressive strength of 11,000 pounds per

square inch (psi), tensile strength of 1,700 psi, and flexural strength of 7,500 psi. Lid shall attach with stainless steel machine bolts and shall be capable of supporting 15,000 pounds over a 10" x 10" area. Pad shall be constructed of 4,000 psi concrete with 6 percent entrained air and with broom finish. Pad reinforcement shall be No. 6, 6" x 6" mesh, placed 3 inches above the bottom of the slab.

## 2.03 CONNECTORS

- A. General. Listed and labeled as grounding connectors for the materials used.
- B. Pressure Connectors. High-conductivity plated units.
- C. Bolted Clamps. Heavy-duty units listed for the application.
- D. Exothermic Welded Connections. Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.
- E. Aluminum-to-Copper Connections. Bimetallic type, conforming to UL 96, "Lightning Protection Components," or UL 467.

## 2.04 ACCESSORIES

- A. Ground Staple. Square shank, barbed, hot dipped galvanized.
- B. Ground Wire Guards. 1" x 8'-0" molded, ultraviolet-light-stabilized plastic.

## 2.05 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
  - 1. Anixter Bros., Inc.
  - 2. Burndy Corporation.
  - 3. A.B. Chance Co.
  - 4. Dossert Corp.
  - 5. Erico Products, Inc.
  - 6. Heary Bros., Inc.
  - 7. Ideal Industries, Inc.
  - 8. ILSCO.
  - 9. Joslyn Manufacturing Co.
  - 10. Lyncole XIT Grounding Div., Lyncole Industries, Inc.
  - 11. Thomas and Betts.

## **PART 3 - EXECUTION**

### 3.01 INSTALLATION

- A. General
  - 1. Ground electrical systems and equipment in accordance with NEC requirements except where the Contract Documents exceed NEC requirements.
  - 2. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors and grounding electrode conductors, except that larger sizes indicated or shown on the Contract Documents shall take precedence.

3. Connect each grounded service conductors to a grounding bus at each building. See electrical site plan for locations and details.

B. Grounding Electrodes

1. Ground Rods. Provide at least one ground rod at each building. Locate ground rods a minimum of one rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel of the rod. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.
2. Ground Enhancement Materials. Where required by the Contract Documents, provide ground enhancement material for grounding electrodes.
  - a. Drill a 12-inch-diameter hole to a depth of 1 foot less than the bottom of the ground electrode. Drive the grounding electrode 1 foot into the bottom of the shaft. Install ground enhancement material to within 1 foot of finished grade.
  - b. Install monument case over ground rod and finish filling the shaft to surface as required. Monument case shall remain accessible, and connections to the grounding electrode shall remain visible when the monument case cover is removed.
3. Enhanced Grounding Electrode.
  - a. Provide enhanced grounding electrodes as follows:
    - 1) Where shown on the Contract Documents, or
    - 2) In the event that multiple driven grounds cannot provide the required resistance to earth.
  - b. Set tube vertically in a 6-inch-diameter drilled hole backfilled the first 6 inches with soil or gravel and the balance of the way up to within 4 inches of the top of the tube with a bentonite slurry, per manufacturer's instructions.
  - c. Place system protective box with grating type cover over the tube and grout in flush with finished grade, maintaining the inside of the box free and clear and open to the atmosphere.
  - d. Comply with all manufacturer installation instructions.
  - e. In the event that the site is rocky and a vertical installation is impossible, provide an L shaped tube type chemically enhanced grounding electrode and install it in a 12-inch-wide trench a minimum of 30 inches deep such that the tube slopes down at the minimum rate of 1/8 inch per foot, beginning at the crook of the L shape. Comply with c and d above.
4. Metallic Water Service Pipe. Provide insulated copper grounding electrode conductors, sized per NEC 250.66, in conduit from the building to main metallic water service entrances to the building. Connect grounding electrode conductors to the main metallic water service pipes by means of ground clamps. Where a dielectric main water fitting is installed, connect the grounding electrode conductor to the street side of the fitting. Do not install a bonding jumper around dielectric fittings. Bond metallic grounding electrode conductor conduit to the conductor at each end.



5. Test Wells. Locate as indicated.

C. Conductors

1. Grounding Electrode Conductors.

- a. Interconnect all grounding electrodes with a grounding electrode conductor sized as shown on the plans or as required by the NEC.
- b. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
- c. Bury exterior grounding electrode conductors at least 30 inches below grade.
- d. Use bare, tinned, stranded copper except as otherwise indicated.
- e. Use bare, stranded copper except as otherwise indicated.

2. Equipment Grounding Conductors.

- a. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.
- b. Use insulated copper conductors up to No. 6 AWG. Use bare stranded copper for sizes No. 4 AWG and larger.

3. Braided-Type Bonding Jumpers. Install to connect ground clamps on water meter piping to bypass water meters electrically except in the situation in which a solid, full capacity bypass piping system is installed. Use elsewhere for flexible bonding and grounding connections, such as bonding metal fence gate leaves to their support posts.

D. Grounding Connections

1. General. Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

- a. Use electroplated or hot tin coated materials to ensure high conductivity and make contact points closer in order of galvanic series.
- b. Make connections with clean bare metal at points of contact.
- c. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.
- d. Aluminum to galvanized steel connections shall be with tin plated copper jumpers and mechanical clamps.
- e. Coat and seal connections involving dissimilar metals with inert material such as bituminous paint to prevent future penetration of moisture to contact surfaces.

2. Exothermic Welded Connections. Use for connections to structural steel and for all underground connections except those at test wells. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

3. Connections at Test Wells. Use compression type connectors on conductors and make bolted and clamped type connections between conductors and ground rods.

4. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a grounding conductor to a ground bus or stud in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and grounding conductors. Size bonding conductors per NEC 250.122 based upon the largest overcurrent protection device trip setting for any contained conductor.
5. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
6. Compression Type Connections. Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
7. Moisture Protection. Where insulated grounding conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.
8. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

#### E. Equipment Grounding

1. Separately derived systems required by NEC to be grounded shall be grounded in accordance with NEC 250.30. In addition, bond the grounded conductor of the separately derived system to the nearest available point on the interior metal water piping system, per NEC 250.104(A), and wherever available to a line side feeder ground conductor.
2. Building Steel. Exposed structural steel building framework shall be bonded to the grounding electrode conductor with a conductor of the same size as the service entrance grounding electrode conductor, per NEC 250.104(C).
3. Utilization Equipment.
  - a. Bond interior metal piping systems and metal air ducts to equipment ground conductors of pumps, fans, electric heaters, and air cleaners serving individual systems.
  - b. Air Duct Equipment Circuits. Install an insulated equipment grounding conductor to duct mounted electrical devices operating at 120 volts and above including air cleaners and heaters. Bond the conductor to each such unit and to the air duct.
  - c. Electric Heating Equipment. Provide an insulated equipment grounding conductor to any of the following equipment:
    - 1) Water Heaters. Bond to enclosure, to grounding terminals on heater units, and to piping.

- 2) Heat Tracing. Bond to grounding sheath of heater cable and to piping. Bond to thermostat and other metallic equipment and enclosures.
  - 3) Sidewalk/Step/Floor Heater and Snow Removal Cable. Bond to grounded sheath of heater cable and to metallic equipment and enclosures.
  - 4) Roof Edge Snow Melt Cable. Bond to grounded sheath of heater and to metallic enclosures, gutters, and downspouts.
4. Underground Distribution System Grounding.
    - a. Manholes and Handholes. Provide a driven ground rod close to the wall and set the rod depth such that 4 inches will extend above the finished floor. Where necessary, install ground rod before the manhole is placed and provide a 1/0 AWG bare tinned copper conductor from the ground rod into the manhole through a sleeve in the manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure sensitive tape or heat shrunk insulating sleeve from 2 inches above to 6 inches below the concrete.
    - b. Connections. Ground all non-current-carrying exposed metal parts associated with manholes, substations, and pad-mounted equipment to the ground rod or ground conductor. Make connections with minimum No. 4 AWG stranded copper wire. Train conductors plumb or level around corners and fasten to manhole walls. Connect to cable armor and cable shields by means of tinned terminals soldered to the armor or shield, or as recommended by manufacturer of splicing and termination kits. Interconnect bare grounding conductors carried with incoming or outgoing circuits with the manhole grounding system.
    - c. Grounding System. Ground non-current-carrying metallic items associated with manholes, substations, and pad-mounted equipment by connecting them to bare underground cable and grounding electrodes arranged as indicated.
  5. Overhead Line Grounding.
    - a. General. Comply with ANSI C2, "National Electrical Safety Code" for "Single Grounded Systems," using two or more electrodes in parallel if a single electrode resistance to ground exceeds 25 ohms.
    - b. Ground Rod Connections. Use exothermic welds for underground connections and connections to rods.
    - c. Lightning Arresters. Separate arrester grounds from other ground conductors to separate ground rods. Interconnect ground rods underground.
    - d. Secondary Neutral and Tank of Transformer. Interconnect and connect to grounding electrode system.
    - e. Attach grounding conductor to wood poles with ground staples. Staples shall be 2'-0" apart, except for a distance of 8'-0" above grade and 8'-0" from top of pole where they shall be 6 inches apart.
    - f. Protect grounding conductors running on the surface of wood poles with guards. Install guards to 8'-0" above grade.
  6. Metal Light Poles. Provide each light pole with a driven ground rod. Provide a grounding electrode conductor for connecting the rod to the pole and to the branch circuit ground conductor.

- a. Bond light poles, metallic conduit systems, and metallic junction boxes to the structure grounding system with 2/0 AWG cable. Bond light fixtures without poles to the branch circuit grounding conductor and to the structure grounding conductor (if present) with conductor sized per NEC 250-122, except not smaller than 4 AWG.

F. Isolated Ground System

1. Provide a parallel system of insulated equipment grounding conductors, isolated from the conduit system and enclosures, to provide a quiet ground for isolated ground receptacles and equipment provided with isolated ground buses.
2. The isolated grounding system shall be connected to the facility [grounding electrode conductor at the service equipment] [ERGB].
3. Clearly identify all isolated ground conductors at all access points in the conduit system to differentiate between isolated grounding and other grounding conductors.
4. Signal and Communications. For telephone, alarm, and communication systems, provide a No. 4 AWG minimum green insulated copper conductor in raceway to each terminal cabinet or central equipment location.

3.02 FIELD QUALITY CONTROL

- A. Tests. Subject the completed grounding system to a ground resistance test at each location where a maximum ground resistance level is specified and at service disconnect enclosure ground terminal. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by [the three-point method] [the fall-of-potential method].
- B. Ground/resistance maximum values shall be as follows:
  1. Equipment Rated 500 Kilovolt Amperes (kVA) and Less. 10 ohms.
  2. Equipment Rated 500 kVA to 1000 kVA. 5 ohms.
  3. Equipment Rated over 1000 kVA. 3 ohms.
  4. Unfenced Substations and Pad Mounted Equipment. 5 ohms.
  5. Manhole Grounds. 10 ohms.
  6. Structure Grounds. 25 ohms.
- C. Deficiencies. Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated, the provisions of the Contract covering change orders will be applied.

3.03 CLEANING AND ADJUSTING

- A. Restore surface features at areas disturbed by excavation and reestablish original grades except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work to their original condition. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging, or mulching. Perform such work in accordance with Division 32 section "Landscape Work." Maintain disturbed surfaces. Restore vegetation in accordance with section "Landscape Work." Restore disturbed paving as indicated.

3.04 LABELING

- A. Provide labeling for the grounding system as specified in Section 26 05 53, "Electrical Identification."

3.05 DEMONSTRATION

- A. Provide a verification tour of all grounding electrode conductor connections for the Engineer and the Owner. Review test reports which verify compliance of ground system with Contract requirements.

END OF SECTION

**SECTION 26 05 29**  
**SUPPORTING DEVICES**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 05 10 00, "Structural Steel," for steel shapes used to fabricate assemblies employed in the support of electrical systems and equipment.
  - 2. Section 26 00 01, "Basic Electrical Requirements."
  - 3. Section 26 00 02, "Basic Electrical Materials and Methods."

1.02 DESCRIPTION OF THE WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install supporting materials and assemblies, sleeves, and seals in accordance with the plans and as specified herein.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work to furnish and install supporting devices in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. National Electrical Code (NEC) Compliance. Components and installation shall comply with National Fire Protection Association (NFPA) 70 (NEC).
  - 2. Certification. Manufactured electrical components shall be listed and labeled by either Underwriters' Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), Canadian Standards Association (CSA), or other approved, nationally recognized testing and listing agency that provides third party certification follow-up services.
  - 3. Manufacturers Standardization Society (MSS) Compliance. Comply with applicable MSS standard requirements pertaining to fabrication and installation practices for pipe hangers and supports.
  - 4. National Electrical Contractors Association (NECA) Compliance. Comply with NECA's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.
  - 5. Federal Specification (FS) Compliance. Comply with FS FF-S-760 pertaining to retaining straps for conduit, pipe, and cable.
  - 6. Metal Framing Manufacturers Association Standard Publication (MFMA)-1.
  - 7. American Institute of Steel Construction "Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings," including "Commentary" of supplements thereto, as issued.
  - 8. The Aluminum Association "Specifications for Aluminum Structures."

- B. Supports, anchors, sleeves, and seals furnished as part of factory fabricated equipment are specified as part of that equipment assembly in other divisions and Division 26 sections.

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
  - 1. Product data for each type of product specified.
  - 2. Hanger and support schedule showing manufacturer's figure, number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.
  - 3. Shop drawings indicating details of fabricated support assemblies.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver supporting materials and assemblies properly packaged in sturdy factory fabricated containers.
- B. Store supporting materials and assemblies in clean, dry spaces in original containers. Protect from weather, damaging fumes, debris, and construction operations.
- C. Handle supporting materials carefully to avoid damage.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURED SUPPORTS

- A. General. Provide manufactured support devices which are listed and labeled. In the event that more than one type of supporting device meets the requirements of the project, and none is specifically indicated on the drawings, device selection is the Contractor's option.
- B. Materials
  - 1. U-channel shall be cold rolled steel, American Society for Testing and Materials (ASTM) A 570, Grade 33, cleaned, primed, and finished in the manufacturer's standard rust inhibiting finish. Clamps, hangers, and hardware shall be steel with electroplated zinc finish or malleable iron.
  - 2. U-channel, clamps, and hangers for supporting conduit and equipment shall be Type 316 stainless steel. Parts, screws, nuts, and rod shall be Type 316 stainless steel. Strut extruded from aluminum alloy 6036-T6 may be substituted for stainless steel where it will not be in contact with concrete or grout and when its strength is sufficient for the application.
  - 3. Provide fittings and accessories made from aluminum alloy 5052-H32 for aluminum strut.
  - 4. Malleable iron fittings and accessories shall be high tensile strength and ductility, ASTM A 47 or ASTM A 48, Class 30A, zinc electroplated, with aluminum lacquer or powder paint finish.

- C. Products shall include but are not limited to the following:
1. Clevis Hangers. Steel for supporting rigid metal conduit, with 3/8-inch hanger rod through 2-inch conduit size; 1/2-inch hanger, 2-1/2-inch and larger conduit size.
  2. Round Steel Rod. Zinc plated, threaded at ends only, 1/2-inch minimum size except as stated in 1 above, with zinc plated hexagon nuts.
  3. Beam Clamp. Malleable iron with 1/4-inch tapped side and back holes for attachment of conduit clamps.
  4. Swivel Beam Clamp. Malleable iron for use with hanger rod. Clamp to have swivel eye hook, closed in the installed position, and malleable iron swivel eye tapped for the hanger rod to which it is attached. Provide jamb nut.
  5. I-Beam Clamps. Steel, 1-1/2-inch-x-3/16-inch stock, 1/2-inch hook rod in 8-, 11-, or 14-inch lengths, as required, with double eye swing connector threaded for 1/2-inch rod. Provide jamb nut for support rod.
  6. Conduit Straps. Malleable iron, one hole.
  7. Clamp Backs. Malleable iron, for use with one hole conduit strap to support conduit away from wall or ceiling surface.
  8. Two-Hole Conduit Straps. Steel, minimum 1/8-inch-thick heavy-duty, zinc electroplated.
  9. Conduit Hangers. Steel, zinc electroplated, for hanging conduit from beam clamps. With 1/4-inch, 20-thread, zinc electroplated closure bolt and square nut. Provide 1/4-inch, 20-thread zinc-electroplated stove bolt to secure hanger to beam clamp.
  10. Duct Bank Conduit Spacers. Nonmetallic spacers to support conduit and maintain spacing during concrete pours.
  11. Riser Clamps. Two cold rolled steel bars, formed to fit the conduit to be supported, 8-1/2-inch-plus-conduit trade diameter long by 1-inch tall (2 inches for 5 inch and larger trade size conduit) by 3/16-inch-thick (1/2 inch through 1-1/2-inch trade size; 1/4 inch thick, 2- through 6-inch trade size), with zinc-electroplated finish. Bars shall be secured around conduit with two electroplated hexhead cap screws and hex nuts.
  12. Fasteners and Anchors. Provide fasteners and anchors to assemble supports and to secure supports to structures. Fasteners, including bolts, nuts, washers, self-tapping anchors, and expansion anchors to be installed out-of-doors, below grade level, or in corrosive atmospheres or process areas shall be stainless steel.
    - a. Anchors for securing 3/4- or 1-inch conduit straps and device boxes to sound concrete walls and ceilings shall be self-tapping anchors, similar and equal to Hilti Kwik-Con II or ITW Buildex Blue Max, 3/16 inch by minimum 1-1/4 inches long, in areas not requiring stainless steel.
    - b. For anchors for use in securing conduit larger than 1 inch, heavier equipment than device boxes, and all fasteners to be used in areas enumerated above as requiring stainless steel fasteners, provide stud type expansion anchors, drop-in two-piece expansion anchors, or adhesive stud anchors, similar and equal to Hilti Kwik-Bolt II, Hilti HDI Drop-in, or Hilti HVA Adhesive Anchor System.
    - c. Fasteners for securing conduit or equipment to metal plate or metal structural members shall be welded studs applied by the electric arc method. Studs for stainless steel or aluminum shall be of the same material as the base metal. Studs



for use in damp or wet environments or out-of-doors shall be stainless steel for use on low carbon steel or stainless steel. Studs shall be similar and equal to TRW Nelson Stud Welding Division low carbon or mild steel or Type 304 or 305 stainless steel, applied with a Nelson stud welder.

13. Provide external cable grips for all flexible cords and cables falling under the purview of NEC Article 400, longer than 6 feet, which do not contain an internal dedicated steel support wire. Grips shall be split mesh type capable of being installed and removed with the cable connected to the supply fitting and the supplied equipment. Mesh shall be high grade tin coated bronze strand for cable supports in noncorrosive interior applications and Type 302/304 stainless steel for exterior or corrosive atmosphere interior installations. Grips shall be lace type (not rod type) and shall be single or double weave as required to support the load with a support safety factor of 10 times the supported load plus 250 pounds. Grips shall be similar and equal to Kellems 022 series.
14. U-Channel. 1-1/2" x 1-1/2" 12-gauge cold rolled steel, 12-gauge stainless steel, or 0.1046-inch-thick extruded aluminum, with solid base or bolt-hole base as required. Provide spring nuts or spring studs and related hardware of material specified hereinbefore appropriate to the U-channel material.
15. Lightweight U-Channel. 5/16" x 1/2" nominal, 18-gauge cold rolled steel, pregalvanized, for support of surface lighting fixtures mounted on the underside of suspended ceiling systems or outlets flush in suspended ceiling systems. Provide 1/4-inch threaded rod and square nuts, box mounting studs, and channel fasteners as appropriate.
16. Perforated Sheet Steel. Provide perforated 11-gauge Type 316 stainless steel sheet. Sheet shall have 1/4-inch holes on 3/8-inch centers. Provide sizes as shown on the contract documents.

## 2.02 STRUCTURAL SHAPE SUPPORTS

- A. General. Provide structural shape supports in the form of individual structural steel angles, channels, or W-shapes as shown on the drawings or required to support equipment or systems.
- B. Supports
  1. Materials.
    - a. Steel shapes, such as angle, channel, or W-shapes, shall be fabricated from ASTM A 36 cold-rolled steel.
  2. Finishes.
    - a. Shapes shall be cleaned, phosphated, and primed with a rust inhibiting primer. Primer shall be applied to cut surfaces.
    - b. Steel shapes which will not be finish painted under Division 9 shall be finish-painted under this Contract with two coats of exterior enamel of a color to be selected by the Engineer/Architect before equipment is mounted. Any finishes damaged during the equipment mounting process shall be repaired to the satisfaction of the Engineer/Architect.
  3. Finishes.
    - a. Shapes shall be cleaned and finished by a hot dip galvanizing process in accordance with ASTM A 123.

- b. Field cuts shall be thoroughly wire brushed and finished with brush applied cold process galvanizing in accordance with ASTM A 780.

## 2.03 FABRICATED SUPPORTS

- A. General. Provide fabricated support assemblies constructed of structural shapes welded together to form a complete, secure, and durable assembly and finished appropriately to withstand the environment in which they are to be employed.
- B. Materials. Provide structural steel angles, channels, and W-shapes hereinbefore specified, cleaned, but without other finish.
- C. Fabrication
  - 1. Steel shapes shall be assembled by full penetration welded connections. Welding shall be performed by a welder who has successfully passed the American Welding Society (AWS) welding qualification tests for AWS D1.1 "Structural Welding Code-Steel."
  - 2. Welds shall be ground smooth and flush so as to present a noninterfering surface for equipment mounting. Disturbed areas around welds shall be wire brushed (ground, if necessary) to remove slag and spall.
  - 3. Entire assembly shall be phosphated, primed and finished with two coats of exterior enamel before installation. Enamel color shall be selected by the Engineer/Architect.

## 2.04 CONDUIT SEALS

- A. General. Provide seals around conductors inside conduits and between conduits and sleeves/bored holes through which conduits penetrate concrete walls and floors.
- B. Materials
  - 1. Expanding Foam Seals. Provide two part silicone sealant which foams in place to fill voids between cables and conduits.
    - a. Foam shall be UL listed as a fire barrier and shall be similar and equal to 3M 2001 RTV Foam. Prior to using this product, ensure that it will not adversely react with conductor insulation or sheath material.
    - b. Provide a foam depth of at least one conduit trade size.

## 2.05 WALL/FLOOR SEALS

- A. General
  - 1. Provide seals around sleeves or conduits penetrating concrete walls which are below grade or water-bearing walls and concrete floors through which conduits pass from below grade.
- B. Materials
  - 1. Provide high strength malleable or ductile iron body and pressure clamp, hot dip galvanized, with Type 316 stainless steel hex head tightening bolts. Body shall include fins designed to prevent water from creeping along the outside of the body. The body shall fit over and seat against a sleeve of high strength, high impact plastic pipe or steel pipe with high organic zinc conductive epoxy coating. A neoprene O-ring shall be included between the body and sleeve to provide a seal between them. Two close fitting pressure rings of polyvinyl chloride (PVC) coated steel shall be located on each side of a neoprene grommet through which the entering conduit passes, which grommet is compressed by the pressure clamp as the tightening bolts are screwed into the body. Assembly shall be similar and equal to O-Z/Gedney FSK series.

2. Provide flanged conduit pipe mounted on the wall or floor over the hole requiring sealing. Secure with stainless steel expanding anchor type studs or adhesive anchor system similar and equal to Hilti HVA with stainless steel studs. Studs shall be the largest diameter which will fit through the predrilled holes in the conduit pipe flange; provide one stud per predrilled hole. Pipe and flange shall be 0.098 inch thick steel with hot dipped galvanized finish. Provide a fire resistant synthetic rubber (FRR) gasket between the flange and the wall to fill voids created by minor wall surface irregularities. Flanged conduit pipe shall be equal to CDS Sealing Systems (CDS) F series with HFS series gasket. Provide an FRR plug to securely close the space between the inner wall of the flanged conduit pipe and the outside of the through passing conduit. Plug shall be serrated on its outer and inner walls and shall include a flat flange on one end to aid in insertion in the pipe. Plug in place shall have a pressure resistance of 15 psi at the base and 30 psi at the flange. Plug shall be manufactured by the flanged conduit pipe manufacturer for use with that product and shall be properly sized to perform its sealing function.

## 2.06 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
  1. Slotted Metal Angle and U-Channel Systems.
    - a. B-Line (Cooper).
    - b. Thomas & Betts.
    - c. American Electric (Steel City).
    - d. Unistrut Diversified Products.
  2. Conduit Supports.
    - a. Appleton.
    - b. Cantex, Inc.
    - c. Carlon.
    - d. Crouse-Hinds.
    - e. Killark.
    - f. Raco, Inc.
    - g. Robroy.
    - h. Thomas & Betts Corp.
  3. Fasteners and Anchors.
    - a. Hilti.
    - b. ITW Buildex.
    - c. Ideal Industries, Inc.
    - d. Rawlplug Co.

4. Seals and Fire-Stops.
  - a. CSD Sealing Systems.
  - b. Dow Corning.
  - c. 3M.
5. Conductor and Cable Supports.
  - a. B-Line Systems.
  - b. Condux International, Inc.
  - c. Kellems, Division of Hubbell, Inc.
  - d. O-Z/Gedney.
  - e. Pass & Seymour/Legrand.
  - f. Red Seal Electric Co.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
- B. Coordinate with the building structural system and with other electrical installations.
- C. For raceway supports comply with the NEC and the following requirements:
  1. Conform to manufacturer's recommendations for selection and installation of supports.
  2. Supports shall be secured to the surface upon which they are mounted with fasteners adequate to carry the present and any indicated future working loads by a safety factor of four times the total working load, defined as the ultimate load. When the ultimate load calculation, either in tension or shear of any fastener is less than 200 pounds, provide fasteners which will develop an ultimate strength of at least 200 pounds in either tension or shear, as applicable, for each support.
  3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
  4. Support parallel runs of horizontal raceways together on trapeze type hangers.
  5. Support individual suspended horizontal conduit runs on pipe hangers suspended on 3/8 inch steel rod from swivel type supports securely anchored to structure. Do not use spring steel clips or other attachments to suspended ceiling supports.
  6. Secure conduit clamps to concrete or masonry walls with concrete screw anchors, stud type expansion anchors, drop-in two-piece anchors, or adhesive stud anchors as strength requirements dictate. Provide stainless steel anchors in damp or wet areas, areas subject to hose down, or out-of-doors. Provide clamp backs for conduit installed on damp or wet walls and for all aluminum conduit on concrete or masonry walls.
  7. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.

8. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
  9. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
  10. Raceway supports shall be provided as required by the NEC and installed as recommended by NECA.
- D. Install vertical conductor supports simultaneously with installation of conductors.
  - E. Miscellaneous Supports. Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
  - F. In open overhead spaces, cast boxes with hubs threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 2 feet from the box.
  - G. Support duct banks entering building, manholes, handholes, and other structures as shown on the drawings.
  - H. Install sleeves in concrete slabs and walls and all fire-rated assemblies.
  - I. Seal all sleeves penetrating concrete water-bearing walls or exterior walls below grade with mechanical seals. In new construction, cast seals into walls or floors. Provide surface mounted mechanical seals over holes cut in existing below grade walls.
  - J. Seal the interior of all conduits entering from below grade with seals as specified. Provide similar seals for conduits in existing water-bearing walls.
  - K. Do not use wood screws except in construction made of wood. Wood screws shall be round head or lag type with electrogalvanized or hot dip galvanized finish.
  - L. Provide No. 8 or larger sheet metal screws into metal studs in drywall construction. Do not use toggle bolts in drywall ceilings or walls.
  - M. Provide fire-stops as specified around electrical work penetrating fire rated assemblies. Install in accordance with the standard UL drawing for the greater fire resistance at the barrier.
  - N. Provide supports fabricated from structural steel or aluminum shapes as detailed on the drawings or as required to support equipment.
  - O. Provide supports for luminaires mounted on the bottom of suspended ceilings. Supports shall be constructed of lightweight U-channel spanning at least two lathes channels or main grid rails with 1/4-inch threaded rod through the ceiling system into the four corners of fluorescent or high intensity discharge (HID) fixtures. Provide a minimum of two 1/4-inch threaded rods to support smaller ceiling surface mounted incandescent or parallel lamp (PL) fluorescent fixtures. Provide fixture stud and carrier to support flush outlet boxes in the ceiling treatment or tile from the U-channel.

- P. Provide stainless mounting hardware for securing electrical equipment to perforated sheet steel.
- Q. The following supports and support methods are specifically prohibited:
  - 1. Strap iron.
  - 2. Wire of any type.
  - 3. Welding other than stud welding as specified.
  - 4. Plastic ties.
  - 5. Piggyback clamps (one conduit supported from another conduit or pipe).
  - 6. Devices which depend upon spring tension to support conduit or to remain in place.
  - 7. Power driven anchors.
  - 8. Clip type devices to secure lighting fixtures to the bottom of lay-in style suspended ceiling grids.

### 3.02 TESTS

- A. Test pull-out resistance of one of each type, size, and anchorage material for the following fastener types:
  - 1. Concrete screw anchors.
  - 2. Expansion anchors.
  - 3. Toggle bolts.
- B. Provide all jacks, jigs, fixtures, and calibrated indicating scales required for reliable testing. Obtain the Engineer/Architect approval before transmitting loads to the structure. Test to 90 percent of rated proof load for fastener. If fastening fails test, revise all similar fastener installations and retest until satisfactory results are achieved.

END OF SECTION

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## SECTION 26 05 33

### RACEWAY

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 12, "Wires, Cables, and Connectors."
  - 4. Section 26 05 34, "Cabinets, Boxes, and Fittings."
  - 5. Section 26 05 29, "Supporting Devices."
  - 6. Section 26 05 53, "Electrical Identification."

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to install raceways in accordance with the plans and as specified herein.
- B. Types. Types of raceways specified in this section include the following:
  - 1. Electrical metallic tubing.
  - 2. Flexible metal conduit.
  - 3. Intermediate metal conduit.
  - 4. Liquidtight flexible metal conduit.
  - 5. Underground plastic utilities duct.
  - 6. Rigid metal conduit.
  - 7. Rigid nonmetallic conduit.
  - 8. Liquidtight flexible nonmetallic conduit.
  - 9. Surface raceways.
  - 10. Wireways.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with raceways in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. National Electrical Code (NEC). Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code."
  - 2. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA standards pertaining to raceways.



3. Underwriters' Laboratories, Inc. (UL) Compliance and Labeling. Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, Electrical Testing Laboratories (ETL), or Canadian Standards Association (CSA).

1.04 SUBMITTALS (NOT USED)

1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.07 SPECIAL WARRANTY (NOT USED)

1.08 SEQUENCING AND SCHEDULING

- A. Coordinate with other work, including metal and concrete deck installation, wires/cables, boxes, and panels, as necessary to interface installation of electrical raceways and components with other work.

**PART 2 - PRODUCTS**

2.01 METAL CONDUIT AND TUBING

- A. Electrical Metallic Tubing (EMT). Steel, hot dip galvanized conforming to American National Standards Institute (ANSI) C80.3 and UL 797.
- B. Rigid Steel Conduit. Rigid steel, hot dip galvanized, threaded type conforming to Federal Specification (FS) WW-C-581E, ANSI C80.1 and UL 6.
- C. Intermediate Steel Conduit. Rigid intermediate grade, hot dip galvanized conforming to FS WW-C-581E, ANSI C80.1, and UL 1242.
- D. Rigid Aluminum Conduit. Rigid aluminum conduit conforming to ANSI C80.5.
- E. Flexible Metal Conduit. FS WW-C-566 and UL 1. Continuous, spirally wound, interlocked galvanized strip steel.
- F. Liquidtight Flexible Metal Conduit. Single strip, flexible, continuous, interlocked, and double wrapped steel; galvanized inside and outside; covered with liquidtight jacket of flexible PVC conforming to UL 360.
- G. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  1. AFC.
  2. Alflex Corp.
  3. Allied Tube and Conduit.
  4. Electri-Flex Company.
  5. Robroy Industries, Inc.
  6. Wheatland Tube Co.

2.02 NONMETALLIC CONDUIT

- A. Rigid Nonmetallic Conduit. PVC, Schedule 40, 90 degrees Celsius ( $^{\circ}$  C.), conforming to NEMA TC-2, UL 651, and NEC Article 347.
- B. Rigid Nonmetallic Conduit (Heavy Wall). PVC, Schedule 80, 90 $^{\circ}$  C., conforming to NEMA TC-2, UL 651, and NEC Article 347.

- C. Liquidtight Flexible Nonmetallic Conduit. Continuous spiral of hard PVC encapsulated with flexible PVC conforming to UL 1660.
- D. Electrical Nonmetallic Tubing. PVC conforming to NEMA TC-13.
- E. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
  - 1. Alflex.
  - 2. Cantex Industries.
  - 3. Carlon.
  - 4. Electric-Flex.

### 2.03 CONDUIT FITTINGS AND ACCESSORIES

- A. General. Provide conduit accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.
- B. Conduit Bodies
  - 1. General. Provide conduit bodies of types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion resistant screws.
  - 2. Rigid Metal. Threaded galvanized cast iron conforming to UL 514B and FS W-C-586D.
  - 3. Hazardous Locations. Threaded galvanized cast iron approved for hazardous locations as identified on plans.
  - 4. EMT. Set-screw type conforming to UL 514B.
  - 5. Nonmetallic. PVC, molded solvent weld connector conforming to UL 514B.
- C. Locknuts. Construct locknuts with sharp edge for digging into metal and ridged outside circumference for proper fastening.
- D. Bushings. Metal, flared bottom, ribbed sides, set screw type grounding terminal and smooth rounded inner circumference.
- E. Conduit Hubs. Threaded hub, metal, locknut/bushing, gasket.
- F. Rigid Metal Conduit Fittings. Threaded cast malleable iron galvanized fittings conforming to FS W-F-408.
- G. EMT Fittings. Steel, set screw type conforming to UL 514B.
- H. Flexible Metal Conduit Fittings. Provide conduit fittings for use with flexible steel conduit of threadless hinged-clamp type.
  - 1. Straight Terminal Connectors. One piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
  - 2. 45-Degree or 90-Degree Terminal Angle Connectors. Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.

- I. Liquidtight Flexible Metal Conduit Fittings. FS W-F-406, Type 1, Class 3, Style G. Galvanized malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated or noninsulated throat.
- J. Rigid Nonmetallic Conduit Fittings. NEMA TC 3, mate and match to conduit type and material.
- K. Liquidtight Flexible Nonmetallic Conduit Fittings. PVC, one piece body with PVC ferrule and neoprene gasket.
- L. Sealing Fittings and Products
  - 1. Mechanical Pipe Seals. See Section 26 05 29, "Supporting Devices."
  - 2. Joint Sealants. Refer to Section 26 05 29, "Supporting Devices."
  - 3. Provide gland type sealing bushings for interior conduit seals. See Section 26 05 29, "Supporting Devices."
  - 4. Explosionproof Seals. Suitable for Class I, Division I, Group D atmosphere.
- M. Escutcheon Plates. Chrome plated, stamped steel, hinged, split-ring escutcheon, with set screw. Inside diameter shall closely fit conduit outside diameter. Outside diameter shall completely cover the opening in floors, walls, or ceilings.
- N. Available Manufacturers. Subject to compliance with requirements, manufacturers offering conduit fittings which may be incorporated in the work include, but are not limited to, the following:
  - 1. Fittings.
    - a. Adalet.
    - b. Appleton Electric.
    - c. Carlon.
    - d. Condux International, Inc.
    - e. Crouse-Hinds.
    - f. Electri-Flex Company.
    - g. Killark Electric Mfg. Co.
    - h. Kraloy.
    - i. O.Z. Gedney.
    - j. Raco (Hubbell).
    - k. Robroy Industries.
  - 2. Escutcheon Plates.
    - a. Chicago Specialty Mfg. Co.
    - b. Sanitary-Dash Mfg. Co.

#### 2.04 WIREWAYS

- A. General. Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.

- B. General Purpose Wireways. NEMA 1 steel, front accessible, totally enclosed with bolted covers. Finish with rust-inhibiting coating and gray baked enamel finish. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.
- C. Oiltight Wireways. NEMA 12, oiltight and dusttight steel with hinged gasketed cover, external latches, and flanged gasketed joints. Finished with gray enamel paint inside and outside.
- D. Watertight Wireways. NEMA 4X, watertight, corrosion resistant stainless steel with hinged gasketed cover, screw clamps, and flanged gasketed joints.
- E. Available Manufacturers. Subject to compliance with requirements, manufacturers offering wireways which may be incorporated in the work include, but are not limited to, the following:
  - 1. American Electric.
  - 2. B-Line Systems, Inc. (Copper).
  - 3. Erickson Electric Equipment Co.
  - 4. GS Metals Corp.
  - 5. Hoffman (Enclosures).
  - 6. Square D Company.

## 2.05 SURFACE RACEWAYS

- A. General. For surface raceways provide sizes and channels as indicated. Provide fittings that match and mate with raceway.
- B. Metal Raceways. Provide surface metal raceway constructed of galvanized steel with snap-on covers, with 1/8-inch mounting screw knockouts in base approximately 8 inches on center. Finish with manufacturer's standard prime coating suitable for painting. Provide raceways of types suitable for each application required.
- C. Nonmetallic Raceways. Provide surface nonmetallic raceway with two piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color. Raceway and system components shall meet UL 94 requirements for nonflammable, self-extinguishing characteristics.
- D. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
- E. Manufacturers. Subject to compliance with requirements, provide products by the following:
  - 1. Surface Metal Raceway.
    - a. Allied Tube & Conduit.
    - b. American Electric.
    - c. B-Line Systems, Inc.
    - d. Erickson Electrical Equipment Co.
    - e. GS Metals Corp.
    - f. Hoffman Co.
    - g. Square D Co.

- h. The Wiremold Co.
- 2. Surface Nonmetallic Raceway.
  - a. Anixter, Inc.
  - b. Hoffman Co.
  - c. Hubbell, Inc.
  - d. Panduit Corp.
  - e. Gardner Bender.
  - f. The Wiremold Co.

### **PART 3 - - EXECUTION**

#### **3.01 EXAMINATION.**

- A. Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify Engineer/Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer/Architect.

#### **3.02 PREPARATION**

- A. General. Field-bend conduit with benders designed for the purpose so as not to distort or vary the internal diameter. Cut conduits straight and properly ream to remove burrs.
- B. Metal Conduits. Cut conduit threads deep and clean. Use of running threads at conduit joints and terminations is prohibited. Conduits installed underground, in slabs, or exterior shall have threads painted with a corrosion inhibiting compound before couplings are assembled. Aluminum conduits in contact with reinforced concrete shall be isolated by a bitumastic coating.
- C. Nonmetallic Conduits. All PVC conduit joints shall be solvent welded to provide a watertight seal capable of sustaining an internal or external pressure of 25 pounds per square inch (psi) for 1 hour. PVC conduit shall be installed in a sand bed except PVC conduit encased in concrete.
- D. Install joint sealers as specified in Section 26 05 29, "Supporting Devices."
- E. Install mechanical pipe seals as specified in Section 26 05 29, "Supporting Devices."

#### **3.03 INSTALLATION - GENERAL**

- A. Complete the installation of raceways before starting installation of cables and wires in raceways. All spare raceways shall be capped or plugged and include a pull wire. All metallic raceways shall be grounded.
- B. Install raceways as indicated in accordance with manufacturer's written installation instructions, and in compliance with NEC and National Electrical Contractors Association (NECA) "Standards of Installation." Use roughing-in dimensions furnished by the supplier for all electrically operated units. Set raceways and boxes for connection to units only after the dimensions and locations clear with other trades. Install units plumb and level, and maintain manufacturer's recommended clearances.
- C. Mechanically assemble metal raceways for conductors to form continuous electrical conductor, and make connections to electrical boxes, fittings, and cabinets to provide effective electrical continuity and a rigid mechanical assembly. Avoid the use of dissimilar metals throughout the system to eliminate the possibility of electrolysis. Where dissimilar

metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.

- D. Size conduits to meet the NEC requirements, except no conduit shall be smaller than 3/4 inch for interior applications or 1 inch for exterior applications. The diameter of embedded conduits shall not exceed one-third of the slab or wall thickness.

### 3.04 CONDUIT INSTALLATION

#### A. Uses Permitted

1. Use EMT only for concealed work in finished areas/offices with metal or wood stud construction.
2. Use flexible steel conduit in finished areas only and only from boxes to recessed lighting fixtures (6-foot maximum length) or for concealed work in existing walls.
3. Use liquidtight flexible steel conduit for the final 24 inches of connections to motors or equipment subject to movement or vibration.
4. Use Schedule 40 PVC conduit for chemical feed and chemical storage areas except for the analog signalwiring. All analog signal (4-20madc) wiring in such areas shall be within PVC coated galvanized rigid steel conduit.
5. Use galvanized rigid steel conduit for all interior installations (except classified area) not exposed to severe moisture or corrosive conditions. For classified area (Class I, DIV 1) use PVC coated rigid steel or an approved aluminum conduit.
6. Use Schedule 40 PVC for conduits located in slabs or under slabs.
7. Use Schedule 80 PVC conduit for all exterior underground installations. The transition from concrete encasement to riser shall be PVC-coated rigid steel conduit.
8. Use galvanized rigid steel conduit for all exterior aboveground installations.

#### B. Routing

1. General. Install exposed conduits and conduits above suspended ceilings, parallel or perpendicular to walls, ceilings, or structural members. Do not run through structural members. Avoid horizontal runs within partitions or side walls. Avoid ceiling inserts, lights, or ventilation ducts or outlets. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.
2. Finished Areas. Conduits installed in finished areas of new construction shall be concealed in walls, in slabs, or above suspended ceilings. New conduits installed in existing finished areas shall be concealed where practical.
3. Concrete Slabs or Floors. Conduits shall not be embedded in concrete slabs or floors except where specifically shown.
4. Waterbearing Walls. Conduits shall not be embedded in waterproofed or waterbearing walls.
5. Underground. Install underground conduits a minimum of 24 inches below finished grade for circuits 600 volts or less and 36 inches for circuits above 600 volts. Concrete encased conduits shall have a minimum of 3 inches of concrete cover for circuits 600 volts and less and 4 inches for circuits above 600 volts. Wherever possible, make changes of direction with long sweep bends having a minimum radius of 2.5 feet.

Conduits shall slope toward manholes or pull boxes and away from building with a pitch of not less than 3 inches in 100 feet. Provide a marker tape over all conduit runs as specified in Section 26 05 53, "Electrical Identification."

C. Penetrations

1. Exterior Walls. Conduits penetrating exterior walls of any structure (other than handholes, manholes, or pull boxes) below grade, at grade floors, or below grade floors shall be sealed to prevent moisture migration as specified in Section 26 05 29, "Supporting Devices." As close as practical to the penetration, install a junction box to allow for the installation of the interior conduit seal.
2. Slabs and Floors. Where PVC conduits are installed in slabs or floors, the transition from embedded to exposed shall be RMC or IMC. The metal conduit shall extend a minimum of 1 inch into the concrete. Where PVC conduits are installed below on-grade slabs or floors, the penetration shall be made with RMC or IMC.
3. Fire Rated Walls. Conduits penetrating fire rated walls, floors, and partitions shall be sealed with a fire rated sealant as described in Section 26 05 29, "Supporting Devices."
4. Roofs. Conduits shall penetrate roofs only where specifically shown on the plans. Roof penetrations shall meet the requirements of Section 07 51 17, "Roofing and Sheet Metal."
5. Finished Walls, Floors, and Ceilings. Where conduits pass through finished walls and ceilings, install escutcheons.

D. Supports. All conduits shall be supported as specified in Section 26 05 29, "Supporting Devices." Support all conduits entering structures as shown on the plans and as specified in Section 26 05 29. Provide reinforcing for concrete duct banks passing through backfilled area. Reinforcing shall extend a minimum of 5 feet beyond excavation.

E. Fittings. Install miscellaneous fittings such as reducers, chase nipples, three piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Use threaded fittings and conduit bodies for RMC and IMC. Install grounding type expansion fittings in raceways every 200 feet of linear run or wherever structural joints are crossed to allow for expansion and contraction. Draw up couplings and conduit sufficiently tight to ensure watertightness. Terminate EMT at all boxes with a connector, locknut, and bushing. Terminate RMC and IMC at NEMA 1 and NEMA 12 boxes with two locknuts, one inside and one outside, and a bushing. Terminate RMC and IMC at NEMA 3R, NEMA 4, and NEMA 4X enclosures and weatherproof equipment enclosures with conduit hub assemblies.

F. Conduit Seals. Provide explosionproof conduit seals where required by the NEC. Install approved sealing compound after conductor installation. Follow all manufacturer's installation practices.

3.05 WIREWAYS INSTALLATION

A. Uses Permitted

1. Use watertight wireways in damp or wet interior areas and for all exterior areas.
2. Use oiltight wireways in dry process areas.
3. Use general purpose wireways in nonprocess areas.

B. Routing. Install wireways parallel or perpendicular to wall, floors, ceilings, or structural members.

- C. Supports. All wireways shall be supported as specified in Section 26 05 29, "Supporting Devices."
- D. Fittings. Install fittings that have been specifically designed and manufactured for their particular application.

### 3.06 CLEANING

- A. During construction, protect partially completed raceway runs from entrance of dirt, moisture, and debris by means of suitable factory made duct plugs. After completion of installation, pull a mandrel through every conduit to check for alignment and clear passage. Use an iron shot mandrel with a diameter of 1/4 inch less than the nominal size of the conduit and with a length equal to the conduit diameter. The mandrel shall have a leather or rubber gasket slightly larger than the conduit opening. After testing the conduits with the mandrel, pull a stiff brush through each duct until it is clear of any particles of earth, sand, or gravel, then install plugs until wire is to be pulled. Clean existing ducts to be used for new cable in the same manner as noted above.

### 3.07 FIELD QUALITY CONTROL

- A. Nonmetallic Conduit Leak Test. A test of system integrity shall be conducted of underground conduits by a low-pressure air test (3.0 to 5.0 psi) after the system is installed and cemented joints are set. Plug and block ends to prevent movement prior to pressurization. Check for leaks with a soap solution. NOTE: Low-pressure air can cause high-thrust loads and caution must be observed.

END OF SECTION



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**SECTION 26 05 34**  
**CABINETS, BOXES, AND FITTINGS**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 33, "Raceways."
  - 4. Section 26 05 29, "Supporting Devices."
  - 5. Section 26 05 26, "Grounding."

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install cabinets, boxes, and fittings in accordance with the plans and as specified herein.
- B. Types of cabinets, boxes, and fittings specified in this section include the following:
  - 1. Outlet and device boxes.
  - 2. Pull and junction boxes.
  - 3. Floor boxes and service fittings.
  - 4. Cabinets.
  - 5. Hinged door enclosures.
  - 6. Boxes for hazardous locations.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work to furnish and install cabinets, boxes, and fittings in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. Underwriters' Laboratories, Inc. (UL) Listing and Labeling. Items provided under this section shall be listed and labeled by UL.
- C. National Electrical Code (NEC) Compliance. Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code."
- D. National Electrical Manufacturers Association (NEMA) Compliance. Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

#### 1.04 SUBMITTALS

- A. General. Furnish manufacturer's product data, test reports, and material certifications.
- B. Shop Drawings. For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store cabinets, boxes, and fittings in clean dry space. Protect products from weather, damaging fumes, construction debris, and traffic.

#### 1.07 SPECIAL WARRANTY (NOT USED)

#### 1.08 DEFINITIONS

- A. Cabinets. An enclosure designed either for surface or for flush mounting having a frame, or trim in which a door or doors may be mounted.
- B. Device Box. A box designed to house a receptacle or a switch.
- C. Enclosure. A box, case, cabinet, or housing for electrical wiring or components.
- D. Hinged Door Enclosure. An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.
- E. Outlet Box. A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- F. Wiring Box. An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

### **PART 2 - PRODUCTS**

#### 2.01 OUTLET, DEVICE, AND WIRING BOXES

- A. Metal Outlet, Device, and Wiring Boxes
  1. Conform to UL 541A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
  2. Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be flat-rolled code gauge galvanized steel with stamped knockouts, threaded screw holes, and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings, and fixture studs. Device boxes shall be minimum of 3-1/2 inches deep.
  3. Provide cast iron boxes of iron alloy, waterproof, with threaded raceway entries and features and accessories suitable for each location, including mounting ears, threaded screw holes for devices, and closure plugs. Device boxes shall be minimum of 2-1/2 inches deep. Outlet boxes shall be minimum of 1-1/2 inches deep.
  4. Provide explosionproof boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

B. Nonmetallic Outlet, Device, and Wiring Boxes

1. Conform to NEMA OS 2, "Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports," and UL 514C, "Nonmetallic Outlet Boxes, Flush Device Boxes and Covers." Boxes shall be molded polyvinyl chloride (PVC) units of type, shape, size, and depth to suit location and application.
2. Provide boxes for concealed work with mounting provisions and wiring entrances to suit installation conditions and wiring method used.
3. Provide boxes for exposed work which are ultraviolet stabilized, nonconductive, high impact-resistant boxes with integrally molded raceway entrance hubs and removable mounting flanges. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching PVC material suitable for the application.

2.02 PULL AND JUNCTION BOXES

- A. General. Comply with UL 50, "Electrical Cabinets and Boxes," for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
- B. General Purposes Boxes. Painted sheet steel with stamped knockouts and with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. Dusttight and Oiltight Boxes. Painted sheet steel without knockouts and with welded seams and oil-resistant gasket. Rated NEMA 12.
- D. Raintight Boxes. Painted galvanized steel, drip shield, with stamped knockouts in bottom only. Rated NEMA 3R.
- E. Weatherproof Boxes. Type 316 stainless steel, welded seams, without knockouts. Stainless steel hardware, seamless gasket, cover clamps on all four sides. Rated NEMA 4X.
- F. Cast Aluminum Boxes. Molded of copper-free aluminum, with gasketed cover and integral threaded conduit entrances.
- G. Cast Iron Boxes. Molded of cast iron alloy with gasketed cover and integral threaded conduit entrances.
- H. Cast Nonmetallic Boxes. Ultraviolet stabilized, nonconductive, high-impact-resistant PVC boxes with gasketed cover and integral mounting flanges.
- I. Explosionproof Boxes. Cast metal boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.03 HINGED DOOR ENCLOSURES

- A. General. Comply with UL 50, "Cabinets and Enclosures," and NEMA ICS6, "Enclosures for Industrial Control and Systems."
- B. General Purpose Enclosures. Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and removable, with 3/4-inch flange around all edges, shaped to cover edge of boxes. Provide three-point handle-operated latch with key lock. Enclosure greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 1 and shall be painted American National Standards Institute (ANSI) 61 gray.

- C. Dusttight and Oiltight Enclosures. Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable, with 3/4-inch flange around all edges, shaped to cover edge of box. Oil resistant gasket. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 12 and shall be painted ANSI 61 gray unless otherwise noted.
- D. Weatherproof Enclosures. Constructed of 14-gauge Type 316 stainless steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable. Rolled lip around door and cabinet. Watertight seamless gasket. Stainless steel door clamps. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted, removable internal mounting panel for component installation. Enclosure shall be rated NEMA 4X.

#### 2.04 CABINETS

- A. General. Comply with UL 50, "Electrical Cabinets and Boxes."
- B. Cabinet shall be constructed of sheet steel, NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24 inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24 inches apart and not over 6 inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.
- C. Provide double doors for cabinets wider than 24 inches. Telephone cabinets wider than 48 inches may have sliding or removable doors.
- D. Provide combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

#### 2.05 FLOOR BOXES

- A. Cast Iron Floor Boxes. Fully adjustable, waterproof, with threaded raceway entrances, adjusting rings, gaskets, and brass floor plates. Where indicated, provide multisection boxes with individual hinged section covers and provide for a duplex receptacle under one or more of the covers.
- B. Steel Floor Boxes. Sheet steel, concretetight, fully adjustable, with stamped knockouts, adjusting rings, and brass floor plates. Where indicated, provide multisection boxes with concealed individual section covers under a common flush floor plate. Provide for a duplex receptacle in one of the concealed section covers and a 1 inch diameter bushed opening in the other.
- C. Service Fittings for Floor Outlet Boxes. Surface mounted horizontal, cast aluminum type, 3 inches high, suitable for finished spaces and finished in satin aluminum, except as otherwise indicated. Provide duplex receptacle or 1-inch bushed opening for telephone or other communications service as indicated. Equip fitting for attaching flat to floor box cover.

#### 2.06 ACCESSORIES

- A. Corrosion Inhibitors. All enclosures containing equipment, terminals, or splices shall have a vapor phase corrosion inhibitor. Provide two spares for each one installed.

## 2.07 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
1. Adalet Enclosure Systems.
  2. American Electric.
  3. Carlon Division of Lamson & Sessions.
  4. Crouse Hinds.
  5. Erickson Electrical Equipment Co.
  6. Hoffman Enclosures.
  7. Killark Electric Mfg. Co.
  8. O.Z. Gedney.
  9. Raco/Bell Division Harvey Hubbell.
  10. Spring City Electrical Mfg. Co.
  11. Square D Co.
  12. Steel City/Thomas & Betts.

## PART 3 - EXECUTION

### 3.01 COORDINATION

- A. Coordinate installation of electrical cabinets, boxes, and fittings with wire/cable, wiring devices, and raceway installation work.

### 3.02 INSTALLATION

- A. Uses Permitted
1. Outlet Boxes.
    - a. Use galvanized flat rolled sheet steel boxes in all dry interior locations unless otherwise noted.
    - b. Use cast metal boxes in all locations exposed to weather or dampness.
    - c. Use galvanized flat rolled sheet steel boxes in finished areas with framed construction.
    - d. Use nonmetallic boxes in corrosive areas as designated on the plans.
    - e. Use explosionproof boxes in hazardous areas as designated on the plans.
    - f. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating suitable for each location installed.
  2. Pull and Junction Boxes.
    - a. Use NEMA 12 boxes in all dry interior locations unless otherwise noted.
    - b. NEMA 1 boxes in electrical rooms.
    - c. Use NEMA 4X boxes in all other locations exposed to weather or dampness.
    - d. Use general purpose boxes in finished areas with framed construction.
    - e. Use explosionproof boxes in hazardous areas as designated on the plans.

3. Hinged Door Enclosures.
  - a. Use NEMA 12 enclosures to house electrical equipment and controls in dry interior locations.
  - b. Use NEMA 1 enclosures to house electrical equipment and controls in dedicated electrical rooms.
  - c. Use NEMA 4X enclosures to house electrical equipment and controls in all other locations.
4. Cabinets.
  - a. Use NEMA 12 enclosures to house electrical equipment and controls in dry interior locations.
  - b. Use NEMA 1 rating for cabinets located in dedicated electrical rooms.
  - c. Use NEMA 4X cabinets to house electrical equipment and controls in all other locations.
5. Floor Boxes.
  - a. Use cast iron floor boxes on grade and wet locations.
  - b. Use concrete tight steel floor boxes in all other locations.

B. General

1. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
2. Support and fasten items securely in accordance with Section 26 05 29, "Supporting Devices."
3. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than size indicated.
4. Remove sharp edges where they may come in contact with wiring or personnel.
5. Install boxes in locations which ensure ready accessibility to enclosed electrical wiring and avoid installing boxes back to back in walls where there would be less than 6 inches (150 millimeters [mm]) separation. Fasten boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Aluminum boxes in contact with reinforced concrete shall be isolated by a bitumastic coating.
6. Provide electrical connections for installed boxes.

C. Outlet, Device, and Wiring Boxes

1. For outlets at windows and doors, locate close to window trim. For outlets indicated above doors, refer to plans for mounting height above finished floor and center outlets above the door opening except as otherwise indicated.
2. For column and pilaster locations, locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions.
3. For outlet boxes for locations in special finish materials for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone, or wood walls, use rectangular shaped boxes with square corners and straight

sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

4. Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.
5. For outlet locations on exterior face of exterior walls, all outlet boxes shall be recessed in the wall.
6. For ceiling outlets for fixtures, where wiring is concealed, use 4-inch round or octagon boxes 1-1/2 inches deep, minimum.
7. For cover plates for surface boxes, use plates sized to box front without overlap.
8. Protect outlet boxes to prevent entrance of plaster and debris.
9. For concrete boxes use extra deep boxes to permit side conduit entrance without interfering with reinforcing, but do not use such boxes with over 6 inch depth.
10. Install floor boxes in concrete floor slabs so they are completely enveloped in concrete except for the top. Where normal slab thickness will not envelop box as specified above, provide increased thickness of the slab. Provide each compartment of each floor box with grounding terminal consisting of a washer-in-head machine screw, not smaller than No. 10-32, screwed into a tapped hole in the box. Adjust covers of floor boxes flush with finished floor.

D. Pull and Junction Boxes

1. Install clamps, grips, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 314 of NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

E. Cabinets and Hinged Door Enclosures

1. Mount with fronts straight and plumb.
2. Install with tops 78 inches above floor.
3. Set cabinets in finished spaces flush with walls.
4. Use spacers to maintain 1/4-inch clearance from wall.

F. Floor Boxes. Install level and flush with finish flooring material.

### 3.03 GROUNDING

- A. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box, or enclosure.



### 3.04 CLEANING AND FINISH REPAIR

- A. Upon completion of installation and before devices and wiring are installed, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions, and weld marks.
- B. For galvanized finish, repair damage using a zinc-rich paint recommended by the manufacturer.
- C. For painted finish, repair damage using matching corrosion-inhibiting touch-up coating.

END OF SECTION

**SECTION 26 05 53**  
**ELECTRICAL IDENTIFICATION**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 09 90 00, "Painting," for related identification requirements.
  - 2. Section 26 00 01, "Basic Electrical Requirements."
  - 3. Section 26 00 02, "Basic Electrical Materials and Methods."

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to perform the work in accordance with the plans and as specified herein.
- B. This section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including, but not limited to, the following:
  - 1. Buried electrical line warnings.
  - 2. Identification labeling for raceways, cables, and conductors.
  - 3. Operational instruction signs.
  - 4. Warning and caution signs.
  - 5. Equipment labels and signs.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with electrical identification in compliance with applicable requirements of governing agencies having jurisdiction, in accordance with these plans, and as specified herein.
- B. National Electrical Code. Provide warning signs where required by National Fire Protection Association (NFPA) 70 "National Electrical Code (NEC)."
- C. American National Standards Institute (ANSI) Compliance. Comply with requirements of ANSI Standard A13.1, "Scheme for the Identification of Piping Systems," with regard to type and size of lettering for raceway and cable labels.

1.04 SUBMITTALS

- A. Transmittals. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
  - 1. Product data for each type of product specified.
  - 2. Schedule of identification nomenclature to be used for identification signs and labels.

3. Samples of each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.

1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING (NOT USED)

1.07 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MATERIALS

A. Box, Conduit, and Raceway Identification

1. Adhesive Labels. Preprinted, flexible, self-adhesive orange vinyl labels with black legend. Legend covered with clear weather and chemical resistant coating.
2. Plastic Sleeves. Preprinted, pretensioned, snap-on, flexible, wraparound plastic sleeves with black legend. Sized to fit conduit diameter.
3. Plasticized Card Stock Tags. Vinyl cloth with preprinted and field printed legends. Orange background, except as otherwise indicated, with eyelet for fastener.
4. Buried Line Warning Tape. Permanent, bright colored (orange), continuous printed, plastic warning tape not less than 6 inches wide by 4 mils thick with continuous metallic strip or core. Printed legend indicative of general type of underground line below.

B. Wire and Cable Identification

1. Colored Marking Tape. Self-adhesive vinyl tape not less than 7 mils thick and 3/4 inch wide.
2. Wire Labels. Self-adhesive wraparound labels with clear heat shrinkable jacket or permanent plastic heat shrinkable labels. Preprinted legends.
3. Aluminum Face Card Stock Tags. Weather resistant, 18 point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, and laminated with moisture resistant acrylic adhesive. Preprint legend to suit the application and punch for tie fastener.
4. Aluminum Wraparound Marker Bands. Bands with stamped or embossed legend and slots or ears for permanently securing around wires, cables, or groups of wires. Four millimeter (mm) thick sheet aluminum.

C. Nameplates and Signs

1. Laminated Plastic. Engraving stock plastic laminate, 1/16 inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Engrave legend in black letters on white face unless otherwise noted and punched for mechanical fasteners.
2. Metal Backed Butyrate. Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 1/4-inch grommets in corners for mounting.
3. Brass or Aluminum Tags. Metal tags with stamped legend, punched for fasteners. Dimensions: 2 inches by 2 inches by 19 gauge.

D. Accessories

1. Fasteners. Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.
2. Cable Ties. Fungus inert, self-extinguishing, one piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-pound minimum tensile strength, and suitable for a temperature range from minus 40 degrees Fahrenheit (° F.) to 185° F. Provide ties in specified colors when used for color coding.

2.02 MANUFACTURERS

A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

1. American Labelmark Co.; Labelmaster Subsidiary
2. Brady Corp.
3. Carlton Industries, Inc.
4. Champion American, Inc.
5. Emed Co., Inc.
6. Grimco, Inc.
7. Ideal Industries, Inc.
8. Kraftbilt.
9. LEM Products, Inc.
10. Markal Corp.
11. National Band and Tag Co.
12. Panduit Corp.
13. Radar Engineers.
14. Seton Identification Products
15. Standard Signs, Inc.

**PART 3 - EXECUTION**

3.01 APPLICATIONS

A. Conduits

1. Over 600 Volts. Identify by words "DANGER: HIGH VOLTAGE" painted in black letters 2 inches high, stenciled at 10-foot intervals over continuous orange background. The following areas shall be identified:
  - a. Exposed conduits or conduits concealed above suspended ceilings.
  - b. Wall or ceiling surfaces in unfinished spaces directly external to conduits concealed in walls or ceilings.
  - c. Floor area in unfinished spaces above conduits running in basement or ground floor slabs.
2. Underground Lines. Identify with warning tape in trench above conduits.

B. Boxes

1. Code Required Caution Signs. Self-adhesive labels indicating system voltage. Install on outside of box cover.
2. Circuit Identification. Self-adhesive labels indicating contained circuits.

C. Wires and Cables

1. Color Coding. Color code service, feeder, and branch circuit conductors as follows:

208/120 Volts	Phase	480/277 Volts
Black	A	Brown
Red	B	Orange*
Blue	C	Yellow
White	Neutral	White
Green	Ground	Green

*\*Where not permitted by inspecting authority, use purple.*

- a. Use conductors with colored insulation or use colored marking tape for sizes 8 American Wire Gauge (AWG) and smaller.
  - b. Use colored cable ties for sizes larger than No. 8 AWG. Apply three ties spaced 3 inches apart at each terminal or splice point.
2. Circuit Identification. Use aluminum wraparound marker bands to identify feeders and branch circuits in manholes, handholes, and pull boxes.
  3. Conductor Labeling. Use wire labels to identify conductors as follows:
    - a. Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
    - b. Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three circuit, four wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/signal wiring, use color coding for wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
    - c. Match identification markings with designations used in panelboards, shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
    - d. Provide securely attached nameplates identifying all ground buses. Provide securely attached nametags to each accessible termination, attachment, or bonding location for each equipment grounding conductor, grounding electrode conductor, and bonding conductor.

#### D. Signs

1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to ensure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. For emergency operating signs, install engraved laminate signs with white legend on red background with minimum 3/8 inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.
3. Provide code required signs for multiple main switches, for standby power systems, and, where required, for generator ground connection.

#### E. Nameplates

1. General. Provide equipment identification nameplates for each major unit of electrical equipment, including central or master units of each electrical system. This includes communication/signal/alarm systems unless unit is specified with its own self-explanatory identification. Text shall match terminology and numbering of the contract documents and shop drawings.
2. Provide 1-1/2-inch high engraved plastic laminated nameplates (2 inches high where two lines of text are required) with 1/2-inch lettering for the following:
  - a. Panelboards, electrical cabinets, and enclosures.
  - b. Access doors and panels for concealed electrical items.
  - c. Switchgear and switchboards.
  - d. Substations.
  - e. Motor control centers.
  - f. Motor starters.
  - g. Transformers.
  - h. Electrical room ground bus.
  - i. Battery racks.
  - j. Power generating units.
  - k. Fire alarm master station or control panel.
  - l. Security monitoring master station or control panel.
  - m. Disconnect switches.
  - n. Control panels.
3. Provide 5/8-inch-high engraved plastic laminated nameplates (1-inch high where two lines of text are required) with 1/4-inch high lettering for individual compartments of the following:
  - a. Substations.
  - b. Switchgear and switchboards.
  - c. Motor control centers.

4. Provide 5/8-inch-high engraved plastic laminated namplates (1-inch high where two lines of text are required) with 1/4-inch high lettering for the following:
  - a. Push-button stations.
  - b. Remote controlled switches.
  - c. Dimmers.
  - d. Control devices.
  - e. Light switches.
  - f. Downstream receptacles protected by an upstream Ground Fault Interrupter (GFI) receptacle. The nameplate shall indicate that the receptacle is supplied through a GFI receptacle and the location of the GFI receptacle.
5. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment. All code requirements for signage shall be met.

### 3.02 INSTALLATION

#### A. General

1. Lettering and Graphics. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
2. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC. Clean surfaces of dust, loose material, and oily films before applying.
3. Sequence of Work. Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
4. Install labels where indicated or at locations for best viewing without interference with operation and maintenance of equipment.

#### B. Painting

1. Clean surface of dust, loose material, and oily films before painting.
2. For galvanized metal, use single component acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy-duty, acrylic-resin block filler. For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.
3. Apply one intermediate and one finish coat of orange silicone alkyd enamel.
4. Apply primer and finish materials in accordance with manufacturer's instructions.

#### C. Buried Line Warning Tape. During trench backfilling, for exterior underground power, control, signal, and communications cables and conduits, install continuous underground plastic line marker, located directly above line at 6 to 8 inches below finished grade. Where multiple lines are installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

#### D. Tape. Apply colored, pressure sensitive plastic tape in half-lapped turns. Apply the last two turns of tape with no tension to prevent possible unwinding. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.

- E. Metal Tags. Attach metal tags with one piece self-locking nylon cable ties.
- F. Cable Ties. Apply cable ties with a special tool or pliers; tighten for snug fit and cut off excess length.

END OF SECTION



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**SECTION 26 12 00**  
**MEDIUM VOLTAGE TRANSFORMER**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 13, "Medium Voltage Cable," for cable terminations to be made at transformers.
  - 4. Section 26 05 53, "Electrical Identification," for signs associated with transformer installations.

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install medium voltage transformer in accordance with the plans and as specified herein.
- B. This section includes distribution and power transformer with medium voltage primaries. Types of transformers specified in this section include the following:
  - 1. Pad Mounted Type.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work to furnish and install medium voltage transformer in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. Field Testing Organization Qualifications. To qualify for acceptance, an independent testing organization must demonstrate, based on evaluation of organization submitted criteria conforming to American Society for Testing and Materials (ASTM) E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.
  - 2. Electrical Component Standard. Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code (NEC)."
  - 3. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Compliance. Comply with applicable requirements of ANSI/IEEE Standards including C2, "National Electrical Safety Code (NESC)."
- B. Qualifications
  - 1. Installer Qualifications. Engage an experienced installer of medium voltage electrical distribution equipment to perform the installation specified in this section. Submit certified evidence of such qualifications to the Owner's Representative.
  - 2. Manufacturer Qualifications. Member firm of National Electrical Manufacturers Association (NEMA) who is regularly engaged in manufacturing transformers that

comply with the requirements of these specifications and that have been used on at least five projects of similar size and scope as this project.

#### 1.04 SUBMITTALS

- A. Transmittals. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
  - 1. Product data for each product specified.
  - 2. Shop drawings for each transformer, including dimensional plans, sections, and elevations showing minimum clearances, installed devices, and materials lists.
  - 3. Wiring diagrams from manufacturer differentiating between manufacturer installed and field installed wiring. Elementary control diagrams in ladder form.
  - 4. Product certificates signed by manufacturer of transformers certifying that their products comply with the specified requirements.
  - 5. Installer certificates signed by the Contractor certifying that installers comply with the requirements specified under "Quality Assurance."
  - 6. Certified copies of manufacturer's design and routine factory tests required by the referenced standards.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING (NOT USED)

#### 1.07 SPECIAL WARRANTY (NOT USED)

#### 1.08 TOOLS, SUPPLIES AND SPARE PARTS

- A. The transformer shall be furnished with all special tools necessary to disassemble service, repair and adjust the equipment. All spare parts as recommended by the equipment manufacturer shall be furnished to the Owner by the Contractor.
- B. The Contractor shall furnish the following minimum spare parts for each transformer.
  - 1. One (1) set of primary fuses of each size provided.
  - 2. One (1) set of lighting arresters for each type provided.
- C. The spare parts shall be packed in containers suitable for long term storage, bearing labels clearly designating the contents and the pieces of equipment for which they are intended.
- D. Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.
- E. Spare parts lists, included with the Shop Drawing submittal, shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.
- F. Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Manufacturers. Subject to compliance with requirements, provide products by the following:

The following shall be selected as the Base Bid:

1. ABB Power Company Inc.
2. Cooper Power Systems
3. General Electric Co.
4. Maddox Industrial Transformers LLC

The following will be considered as an Alternate Deduct:

5. Eaton, Cutler Hammer
- B. The Contractor shall coordinate the shop drawing submittal, procurement of the transformer, and delivery time frame so that the installation is complete and fully operational prior to the substantial completion date in the Contract. Base Bid should be based on best price that meets the requirements of the specifications.

### **2.02 MATERIALS**

- A. Transformer, General

1. Provide medium voltage transformer which IS factory assembled and tested, general purpose, air cooled, liquid filled, and having characteristics and capacities as indicated.
2. Windings shall be two winding type, copper, designed for operation with high voltage windings connected to a 3 phase, 3 wire and 4-wire, 60 hertz (Hz), grounded neutral system as shown on the drawings.
3. Sound level of transformers for this project shall be minimum of 3 decibels (db) less than NEMA TR 1 standard sound levels for transformer type and size indicated when factory tested in accordance with applicable ANSI standard. Audible sound level tests shall be added to routine factory tests performed on transformers for this project.
4. (Note: NEMA Standard TR1 is available from NEMA for reference with regard to sound levels even though it has been rescinded as an overall transformer standard.)
5. Windings. Copper.

- B. Pad Mounted Transformer

1. Comply with ANSI/IEEE C57.12.26 and with the following features and ratings.
2. Size: The size, rating and quantity, shall be as follows:
  - a. One 500 KVA, three phase, 4,160V-480Y/277V
3. Insulating Liquid. Mineral oil, conforming to ASTM D 3487, "Specifications for Mineral Insulating Oil Used in Electrical Apparatus," Type II, tested in accordance with ASTM D 117, "Guide to Test Methods and Specifications for Electrical Insulating Oils of Petroleum Origin."
4. Insulation Temperature Rise. 65° C.
5. Basic Impulse Insulation Level. 95 KV.

6. Full Capacity Voltage Taps. Four nominal 2.5 percent taps, two above and two below rated high voltage, with externally operable tap changer for de-energized use, padlockable, with position indicator.
7. Primary Switch. 4-position, T-blade style, load break, liquid submerge internal switch. The switches will be interlocked with the primary fuses as specified.
8. Primary Fuses. Current limiting type in dry fuse holder wells, mechanically interlocked with oil switch to prevent disconnect under load.
9. High Voltage Terminals. Arranged for loop feed with 3 phase, four position, gang operated load break switch, with hook stick operated handle in the primary compartment.
10. Surge Arresters. Comply with NEMA Standard LA 1, Distribution Class, supported from tank wall within high voltage compartment, one for each primary phase.
11. Separable Insulated Connectors. Insulated bushing, parking stand, feed through bushing, and dead front elbow type lightning arrester for each high voltage terminal. Provide three portable insulated bushings for parking energized load break connectors on parking stands.
12. The high voltage incoming line compartment shall be dead-front, and shall enclose the high voltage bushings, and provide for cabling from below. Dead-front primary bushings shall be universal bushing wells with dead front inserts or dead front, "feed thru" inserts as required for primary loop configuration. The compartment shall have a hinged door with a fastening device which is accessible only through the low voltage compartment and makes possible the use of a single padlock.
13. The Contractor shall furnish dead front, load break elbow cable terminators.
14. Accessories. Provide the following accessories:
  - a. One inch drain valve with sampling device.
  - b. Dial type thermometer.
  - c. Liquid level gauge.
  - d. Pressure vacuum gauge.
  - e. Pressure relief device, self-sealing with indicator.
  - f. Key interlock on HV compartment door.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install transformer and accessories in accordance with manufacturer's written installation instructions.
- B. Identify transformer in accordance with Section 26 05 53, "Electrical Identification."
- C. Tighten electrical connectors and terminals in accordance with manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- D. Ground transformer and tighten connections to comply with tightening torques specified in UL Standard 486A.

- E. Ground substation type transformer to ground bus to provide a maximum ground resistance at transformer location per specification Section "Field Quality Control," "Ground Resistance Maximum Values."
- F. Use exothermic welded grounding connections for wire-to-wire and wire-to-rod grounding connections. Make exothermic welds in accordance with the manufacturer's written recommendations. Welds that puff up or show convex surfaces are not acceptable. No mechanical connectors are required at exothermic weldments.
- G. Arrange and pay for the services of a factory authorized service representative to supervise the field assembly and connection of components and the pretesting and adjustment of transformer, components, and accessories.
- H. Perform the following preparations upon completing installation of the system for tests:
  - 1. Make insulation resistance tests for transformers.
  - 2. Make continuity test for windings and remote alarm circuits.
  - 3. Furnish a set of contract drawings to test organization.
  - 4. Provide manufacturer's installation and testing instructions to test organization.
- I. Conform to International Electrical Testing Association (NETA) Standard ATS, "Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems," ANSI/IEEE Standard C57.90.
- J. Correct deficiencies identified by tests and make ready for retest. Verify that the total system meets the specified requirements.
- K. Upon completion of installation, inspect interiors and exteriors of accessible components. Remove paint splatters and other spots, dirt, and construction debris. Touch up scratches and mars of finish to match original finish.
- L. Adjust transformer taps to provide optimum voltage conditions at utilization equipment.
- M. Provide final protection and maintain conditions in a manner that ensures protection of transformers from damage or deterioration until Substantial Completion.
- N. Arrange and pay for the services of a factory authorized service representative to demonstrate transformers and accessories and training of Owner's staff.
- O. Train Owner's staff in operation and maintenance for at least 1 day. Include both classroom training and hands on equipment operation and maintenance procedures. Training shall include:
  - 1. Safety precautions.
  - 2. Features and construction of project transformers and accessories.
  - 3. Routine inspection and test procedures.
  - 4. Routine cleaning.
  - 5. Features and operation and maintenance of integral disconnect and protective devices.
  - 6. Interpretation of readings of indicating and alarm devices.
  - 7. Fuse selection.
  - 8. Protective relay setting considerations.
  - 9. Features, operation, and maintenance of separable insulated connector system.

10. Tap changing procedures.
- P. Schedule training with Owner and Engineer/Architect with at least 7 days' advance notice.

END OF SECTION

**SECTION 26 28 00**  
**OVERCURRENT PROTECTIVE DEVICES**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 53, "Electrical Identification."

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to install overcurrent protective devices (OCPDs) in accordance with the plans and as specified herein.
- B. Miscellaneous. This section includes OCPDs rated 600 volts and below and switching devices commonly used with them.
- C. Panelboards, Switchboards, and Motor Control Centers. Application, installation, and other related requirements for OCPD installations in distribution equipment are specified in other Division 26 sections.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with OCPDs in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. Electrical Component Standard. Components and installation shall comply with National Fire Protection Association (NFPA) 70, "National Electrical Code (NEC)."
  - 2. Listing and Labeling. Provide products specified in this section that are listed and labeled.
    - a. The terms "listed" and "labeled" shall be defined as they are in the NEC, Article 100.
- B. Single-Source Responsibility. Obtain similar OCPDs from a single manufacturer.

1.04 SUBMITTALS

- A. General. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Submittals. Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
  - 1. Product data for fuses, circuit breakers, and OCPD accessories specified in this section, including descriptive data and time-current curves for all protective devices and let-through current curves for those with current limiting characteristics. Include coordination charts and tables and related data.



1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver OCPDs and components in factory-fabricated-type containers or wrappings, which properly protect devices from damage.
- B. Store OCPDs in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle OCPDs carefully to prevent physical damage to circuit breakers and components. Do not install damaged circuit breakers; remove from site and replace damaged devices with new.

1.07 SPECIAL WARRANTY (NOT USED)

1.08 DEFINITIONS

- A. OCPD. A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.
- B. Ampere Squared Seconds. An expression of available thermal energy resulting from current flow. With regard to current limiting fuses and circuit breakers, the ampere squared seconds during fault current interruption represents the energy allowed to flow before the fuse or breaker interrupts the fault current within its current limiting range.

**PART 2 - PRODUCTS**

2.01 MATERIALS

- A. General
  - 1. Provide OCPDs in indicated types, as integral components of panelboards, switchboards, and motor control centers; and also as individually enclosed and mounted single units.
  - 2. Enclosures. National Electrical Manufacturers Association (NEMA) 250, "Enclosures for Electrical Equipment (1000 volts Maximum)."
- B. Cartridge Fuses
  - 1. NEMA Standard FU1, "Low Voltage Cartridge Fuses." Unless indicated otherwise, provide nonrenewable cartridge fuses of indicated types, classes, and current ratings that have voltage ratings consistent with the circuits on which used.
- C. Molded Case Circuit Breakers
  - 1. General. UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."
  - 2. Construction. Bolt-in type, except breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.
  - 3. Characteristics. Frame size, trip rating, and number of poles shall be as indicated on the drawings. The short circuit interrupting capacity shall be as shown in drawings for 480Y/277 volt systems and 10,000 amperes symmetrical for 208Y/120 volt and 120/240 volt systems, unless a greater rating is indicated.
  - 4. Tripping Device. Quick-make, quick-break toggle mechanism with inverse time delay and instantaneous overcurrent trip protection for each pole.

5. Adjustable Instantaneous Trip Devices. Factory-adjusted to low trip setting current values.
6. Enclosure for Switchboard or Panelboard Mounting. Suitable for panel mounting in switchboard or panelboards where indicated.
7. Enclosure for Motor Control Center Mounting. Provide individual mounting where indicated.
8. Enclosure for Independent Mounting. NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.
9. Combination Circuit Breakers and Ground Fault Circuit Interrupters. UL 943, "Ground Fault Circuit Interrupters," arranged for sensing and tripping for ground fault current in addition to overcurrent and short circuit current. Provide features as follows:
  - a. Match features and module size of panelboard breakers and provide clear identification of ground fault trip function.
  - b. Trip Setting for Ground Fault. 30 milliamperes.
10. Current Limiting Circuit Breakers. Arranged to limit let-through ampere squared seconds during fault conditions to a value less than the ampere squared seconds of one-half cycle wave of the prospective symmetrical fault current. The circuit breaker shall use no fusible devices in its operation. The current limiting characteristic shall be in addition to normal time delay and instantaneous trip characteristics.
11. Circuit Breakers with Solid-State Trip Devices. Provide indicated circuit breakers with solid-state trip devices having the following features:
  - a. Ambient Compensation. Trip device insensitive to temperature changes between 20 degrees Celsius ( $^{\circ}$  C.) and  $+55^{\circ}$  C.
  - b. Adjustability. Breaker ratings and trip settings shall be changeable by operation of controls on front panel of breaker, by change of plug-in element without removing breaker from mounting, or by a combination of the two methods.
  - c. Ground Fault Tripping. Adjustable for pickup and time delay values. Provide for indicated units. Include labeled light or indicator to indicate cause of trip.

D. Insulated Case Circuit Breakers

1. General. UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."
2. Ratings. Continuous current, interrupting, and short time current ratings, and voltage and frequency ratings as indicated.
3. Operating Mechanism. Mechanically and electrically trip free, stored energy operating mechanism with the following features:
  - a. Moving Contacts Closing Speed. Independent of both control and operator.
  - b. Stored Energy Mechanism. Electrically charged, with provision for optional manual charging.
4. Circuit Breaker Trip Devices. Solid-state overcurrent trip device system that includes one integrally mounted current transformer or sensor per phase, a release mechanism, and the following features:

- a. Functions. Long time delay, short time delay, and instantaneous trip functions, which are independent of each other in both action and adjustment.
  - b. Temperature compensation to ensure accuracy and calibration stability from -20° C. to +55° C.
  - c. Field adjustable, time current characteristics.
  - d. Current Adjustability. Effected by operating controls on front panel or by changing plug-in elements or current transformers or sensors.
  - e. Three bands for long time and short time delay functions marked "minimum," "intermediate," and "maximum."
  - f. Five pickup points, minimum, for long time and short time trip functions.
  - g. Six pickup points, minimum, for instantaneous trip functions.
  - h. Ground fault protection with at least three short time delay settings and three trip time delay bands. Adjustable current pickup.
  - i. Trip Indication. Labeled lights or mechanical indicators on trip device shall indicate type of fault causing breaker trip. If lights are used, integral power source shall maintain indication for 60 hours, minimum.
5. Auxiliary Contacts for Remote Indication. Where remote indication of breaker position is indicated, provide a spare auxiliary switch in addition to other auxiliary switches required for normal breaker operation. The spare auxiliary switch shall consist of two Type "a" and two Type "b" stages (contacts), wired to a terminal block in the breaker housing.
6. Circuit Breaker Features and Accessories. Include the following:
- a. Operating Handle. Provide one for each manually operated breaker.
  - b. Electric Close Button. Provide one for each electrically operated breaker.
  - c. Indicating Lights. Contacts for "Breaker Open" and "Breaker Closed" for main and bus tie circuit breakers, and for other indicated breakers.
- E. OCPD Accessories
- 1. Key Interlocks. Arrange interlocking so keys are held captive at devices indicated. Where future key interlocking provisions are indicated, provide necessary mountings and hardware as required for the future installation.
  - 2. Labels. Install label inside enclosure identifying the type of OCPD installed, its overcurrent rating, its interrupt rating, and UL class. Where applicable, trip settings and time delays should be provided on permanent labels.
  - 3. Adjustable Time Delay Undervoltage Trip Devices. For indicated OCPDs.
  - 4. Shunt Trip Devices for Circuit Breakers. Where indicated, arrange to trip breaker from an external source of power through a control switch or relay contacts.
- F. Extra Materials
- 1. For types and ratings required, furnish spare fuses, amounting to one fuse for every five installed fuses, but not less than one set of three of each type of fuse.

## 2.02 MANUFACTURERS

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
1. Cartridge Fuses.
    - a. Bussmann Div., Cooper Industries, Inc.
    - b. Eagle Electric Mfg. Co., Inc.
    - c. Ferraz Shawmut.
    - d. General Electric Co.
    - e. Littelfuse Inc.
  2. Molded-Case Circuit Breakers.
    - a. Eaton, Cutler Hammer Products.
    - b. Crouse-Hinds Distribution Equipment.
    - c. ABB Power Distribution, Inc.
    - d. General Electric Co.
    - e. Square D Co.
  3. Combination Circuit Breaker and Ground Fault Circuit Interrupters.
    - a. Eaton, Cutler Hammer Products.
    - b. Crouse-Hinds Distribution Equipment.
    - c. General Electric Co.
    - d. Siemens Energy & Automation, Inc.
    - e. Square D Co.
  4. Molded-Case Current Limiting Circuit Breakers.
    - a. Eaton, Cutler Hammer Products.
    - b. General Electric Co.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D Co.
  5. Molded-Case Circuit Breakers with Solid-State Trip Devices.
    - a. Eaton, Cutler Hammer Products.
    - b. General Electric Co.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D Co.
  6. Insulated-Case Circuit Breakers.
    - a. Eaton, Cutler Hammer Products.
    - b. General Electric Co.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D Co.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Independently Mounted OCPDs. Locate as indicated and install in accordance with manufacturer's written installation instructions.
- B. OCPDs in distribution equipment shall be factory-installed.

### **3.02 IDENTIFICATION**

- A. Identify components in accordance with Section 26 05 53, "Electrical Identification."

### **3.03 CONTROL WIRING INSTALLATION**

- A. Install wiring between OCPDs and control/indication devices as specified in Section 26 05 12, "Wires, Cables, and Connectors," for hard wired connections.

### **3.04 CONNECTIONS**

- A. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

### **3.05 GROUNDING**

- A. Provide equipment grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounding.

### **3.06 FIELD QUALITY CONTROL**

- A. Visual and Mechanical Inspection. Include the following inspections and related work.
  - 1. OCPD Ratings and Settings. Verify indicated ratings and settings to be appropriate for final system arrangement and parameters. Where discrepancies are found, test organization shall recommend final protective device ratings and settings. Use accepted revised ratings or settings to make the final system adjustments.
  - 2. Inspect for defects and physical damage, NRTL labeling, and nameplate compliance with current single line diagram.
  - 3. Exercise and perform operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
  - 4. Check tightness of electrical connections of OCPDs with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
  - 5. Clean OCPDs using manufacturer's approved methods and materials.
  - 6. Verify installation of proper fuse types and ratings in fusible OCPDs.
- B. Electrical Tests. Include the following items performed in accordance with manufacturer's instructions:
  - 1. Insulation resistance test of OCPD conducting parts. Insulation resistance less than 100 megohms is not acceptable.
  - 2. Use primary current injection to check performance characteristics of trip units of insulated case circuit breakers and molded case breakers over 600 ampere frame size. Trip characteristics not falling within manufacturer's published time current

characteristic tolerance bands when adjusted to approved parameters are not acceptable. Perform the following tests:

- a. Determine minimum pickup current acceptable per manufacturer's instructions.
  - b. Determine long time delay at 300 percent pickup current.
  - c. Determine short time pickup current and corresponding delay time.
  - d. Determine ground fault current pickup and corresponding delay time.
  - e. Determine instantaneous pickup current value.
3. Verify trip unit reset characteristics for insulated case circuit breakers.
  4. Make adjustments for final settings of adjustable trip devices.
  5. Activate auxiliary protective devices such as ground fault or undervoltage relays, to verify operation of shunt trip devices.
  6. Check stored energy charging motors for proper operation of motor, mechanism, and limit switches.
  7. Check operation of electrically operated OCPDs in accordance with manufacturer's instructions.
  8. Check key and other interlock and safety devices for operation and sequence. Make closing attempts on locked open and opening attempts on locked closed devices including moveable barriers and shutters.
- C. Retest. Correct deficiencies identified by tests and observations and provide retesting of OCPDs by testing organization. Verify by the system tests that specified requirements are met.

### 3.07 CLEANING

- A. Upon completion of installation, inspect OCPDs. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

### 3.08 DEMONSTRATION

- A. Training. Arrange and pay for the services of factory authorized service representatives to demonstrate OCPDs and train Owner's maintenance personnel.
- B. Conduct a minimum of one-half day of training in operation and maintenance as specified under "Instructions to Owner Employees" in the "Project Closeout" section of these specifications. Include both classroom training and hands-on equipment operation and maintenance procedures.
- C. Schedule training with at least 7 days' advance notification.

END OF SECTION

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## SECTION 26 28 13

### FUSES

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Division 26 Basic Electrical Materials and Methods sections apply to work of this section.
- C. The following Division 26 sections contain requirements that relate to this section:
  - 1. "Motor Disconnects."
  - 2. "Motor Control Centers."
  - 3. "Motor Controllers."

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to install fuses in accordance with the plans and as specified herein.
- B. Extent of fuse work required by this section is indicated by drawings, and by requirements of this section.
- C. Types of fuses specified in this section include the following:
  - 1. Class L time-delay.
  - 2. Class RK1 and RK5 time-delay.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with fuses in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. Underwriters' Laboratories, Inc. (UL) Compliance and Labeling. Comply with applicable provisions of UL 198 for the class indicated. Provide overcurrent protective devices which are UL listed and labeled.
  - 2. National Electrical Code (NEC) Compliance. Comply with NEC as applicable to construction and installation of fusible devices.
  - 3. American National Standards Institute (ANSI) Compliance. Comply with applicable requirements of ANSI C97.1 "Low Voltage Cartridge Fuses 600 Volts or Less."

##### 1.04 SUBMITTALS

- A. Transmittals. Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. Product Data. Submit manufacturer's technical product data on fuses, including specifications, and electrical characteristics. In addition, include voltages and current ratings, interrupting ratings, current limitation ratings, time current trip and melt characteristic curves, and mounting requirements.



1.05 JOB CONDITIONS (NOT USED)

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fuses and components properly packaged in factory-fabricated-type containers.
- B. Store fuses and components in original packaging and in a clean dry space; protect from weather and construction traffic.
- C. Handle fuses and components carefully to avoid breakages, impacts, denting, and scoring finishes. Do not install damaged fuses; replace and return damaged units to equipment manufacturer.

1.07 SPECIAL WARRANTY (NOT USED)

**PART 2 - PRODUCTS**

2.01 MATERIALS

- A. General. Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time current and peak let through current characteristics indicated, which comply with manufacturer's standard design, materials, and constructed in accordance with published product information, and with industry standards and configurations. See plans for specific type selections.
- B. Class L Time Delay Fuses. Provide UL Class L time-delay fuses, with 200,000 RMS symmetrical interrupting current rating for protecting service entrances and main feeder circuit breakers.
- C. Class RK1 and RK5 Time Delay Fuses. Provide UL Class RK1 and RK5 time-delay fuses, with 200,000 RMS symmetrical interrupting current rating for protecting motors and circuit breakers.

2.02 EXTRA MATERIALS

- A. Maintenance Stock, Fuses. For types and ratings required, furnish additional fuses, amounting to one unit for every installed unit.

2.03 MANUFACTURERS

- A. Manufacturers. Subject to compliance with requirements, provide fuses of one of the following:
  - 1. Bussmann Div.; Cooper Industries.
    - a. Equipment Types: KRP-C, KTN-R, KTS-R, FRN-R, FRS-R, LPN-RK, LPS-RK.
  - 2. Shawmut Div.; Gould Inc.
    - a. Equipment Types: A4BY, A2K, A6K, TR, TRS, A2D, A6D.
  - 3. Little Fuse Tracer.
    - a. Equipment Types: KLPC, KLNK, KLSR, FLNR, FLSR, LLNRK, LLNRK, LLSRK.
  - 4. Reliance Fuse; Brush Fuses.
    - a. Equipment Types: LCL, NCLR, SCLR, ECNR, ECSR, LENRK, LESRK.

## 2.04 IDENTIFICATION

- A. General. Provide fuse identification nameplates complying with Division 26 Basic Materials and Methods section "Electrical Identification." Tags shall be engraved plastic laminate and shall clearly identify fuse class, voltage, and current rating. Mount nameplate on switch or protected equipment cover.

## **PART 3 - EXECUTION**

### 3.01 INSTALLATION OF FUSES

- A. Installation. Install fuses as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. Comply with NEC and National Electrical Manufacturers Association (NEMA) standards for installation of fuses.
- B. Coordination. Coordinate with other work, including electrical wiring, as necessary, to interface installation of fuses with other work.
- C. Install fuses in fusible switches.

### 3.02 EXAMINATION

- A. General. Examine areas and conditions under which fuses are to be installed, and notify Engineer/Architect, in writing, of conditions detrimental to proper completion of the work. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to the Engineer/Architect.

### 3.03 FIELD QUALITY CONTROL

- A. General. Prior to energization of fusible devices, test devices for continuity of circuitry and for short circuits. Replace malfunctioning units with new units, and then demonstrate compliance with requirements.

END OF SECTION

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## SECTION 26 28 16

### CIRCUIT AND MOTOR DISCONNECTS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 05 12, "Wires, Cables, and Connectors."
  - 4. Section 26 05 33, "Raceway."
  - 5. Section 26 05 34, "Cabinets, Boxes, and Fittings."
  - 6. Section 26 28 00, "Overcurrent Protective Devices."

##### 1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and material necessary to install circuit and motor disconnects in accordance with the plans and as specified herein.
- B. Extent of circuit and motor disconnect switch work is indicated by drawings and schedules.
- C. Types of circuit and motor disconnect switches in this section include the following:
  - 1. Equipment disconnects.
  - 2. Motor circuit disconnects.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with circuit and motor disconnects in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. National Electrical Code (NEC) Compliance. Comply with NEC requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.
  - 2. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with requirements of UL 98 "Enclosed and Dead Front Switches." Provide circuit and motor disconnect switches which have been UL listed and labeled.
  - 3. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA Standards Pub. Nos. KS 1, "Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)," and 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

##### 1.04 SUBMITTALS

- A. General. Submit manufacturer's product data, test reports, and material certifications.

##### 1.05 JOB CONDITIONS

- A. Not used.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver circuit and motor disconnect switches properly packaged in factory-fabricated-type containers or wrappings which properly protect devices from damage.
- B. Store circuit and motor disconnect switches in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle circuit and motor disconnect switches carefully to prevent physical damage. Do not install damaged disconnect switches; remove from site and replace damaged devices with new.

## 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Heavy-Duty Safety Switches. Provide surface-mounted, heavy-duty-type, sheet steel enclosed safety switches, of types, sizes, and electrical characteristics as required for the indicated installation; fused, if noted on plan. Provide switches incorporating quick make, quick break type switches, so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable and is padlockable in OFF position. Interlock enclosure door with operating handle such that the door cannot be opened with the switch closed. Provide an inconspicuous defect mechanism for use by maintenance personnel. Construct current carrying parts of high conductivity copper with silver tungsten type switch contacts; and positive pressure type reinforced fuse clips where fusible switches are specified or required by code. Provide NEMA Type 12 enclosures for all switches located in dry interior locations. Provide NEMA Type 4X stainless steel enclosures for all other locations.
- B. Fuses. Provide fuses for safety switches, as noted on plans and as described in Section 26 28 00, "Overcurrent Protection Devices."

#### 2.02 MANUFACTURERS

- A. Manufacturer. Subject to compliance with requirements, provide circuit and motor disconnects of one of the following (for each type of switch):
  - 1. Square D Company.
  - 2. Cutler-Hammer, Inc.
  - 3. General Electric Co.
  - 4. Crouse-Hinds Co.

### **PART 3 - EXECUTION**

#### 3.01 INSTALLATION

- A. Install circuit and motor disconnect switches as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and National Electrical Contractor's Association (NECA) "Standard of Installation," and in accordance with recognized industry practices.
- B. Coordinate circuit and motor disconnect switch installation work with electrical raceway and cable work, as necessary for proper interface.

- C. Locations of disconnect switches as shown on the plans are approximate unless dimensioned. Install disconnect switches as close to the equipment served as practical, but at a readily accessible location with adequate working clearances to meet all NEC requirements.
- D. Provide a suitable means for mounting all disconnect switches.

### 3.02 GROUNDING

- A. Provide equipment grounding connections, tightened to ensure a permanent and effective ground, for all electrical disconnect switches.

### 3.03 FIELD QUALITY CONTROL

- A. Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest. Corrective action and repeated tests shall be accomplished at the Contractor's own expense.

END OF SECTION

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**SECTION 26 29 00**  
**LOW VOLTAGE MOTOR CONTROLLERS**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. Related Sections. The following sections contain requirements that relate to this section.
  - 1. Section 26 00 01, "Basic Electrical Requirements."
  - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 3. Section 26 28 16, "Circuit and Motor Disconnects," for fusible switches used in motor controllers.
  - 4. Section 26 05 53, "Electrical Identification," for identification labels and warning signs for motor controllers and their components.
  - 5. Section 26 05 26, "Grounding."
  - 6. Section 26 28 00, "Overcurrent Protective Devices," for circuit breakers, fuses, and other similar devices used in motor controllers.
  - 7. Section 40 93 13, "Control Devices," for control devices used in motor controllers.

1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install motor controllers in accordance with the plans and as specified herein.
- B. Extent of motor controller work is indicated by drawings.
- C. Types of motor controllers specified in this section include the following:
  - 1. Adjustable Frequency Drive.
- D. The harmonic requirements, simulations, and testing required by this specification associated with adjustable frequency drives shall be the responsibility of the equipment supplier. It is not the intent of this specification to require the equipment supplier to limit harmonics or distortion due to sources other than those specified herein.

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work to furnish and install motor controllers in accordance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. Electrical Code Compliance. Comply with applicable local electrical code requirements of the authority having jurisdiction and National Electrical Code (NEC) Articles 220, 250, and 430, as applicable to installation and construction of motor controllers.
  - 2. National Fire Protection Association (NFPA) Compliance. Comply with applicable requirements of NFPA 70E, "Standard for Electrical Safety Requirements for Employee Workplaces."



3. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with applicable requirements of UL 486A and B, and UL 508, pertaining to installation of motor controllers. Provide controllers and components which are UL listed and labeled.
4. Institute of Electrical and Electronic Engineers (IEEE) Compliance. Comply with recommended practices contained in IEEE Standard 141, "Recommended Practice for Electric Power Systems for Industrial Plants," pertaining to motor controllers. Comply with applicable requirements of IEEE Standard 519-1992, "Recommended Practices and Requirements for Harmonic Control in Electric Power Systems."
5. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA Standard ICS 2, "Industrial Control Devices, Controllers and Assemblies," and Pub No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)," pertaining to motor controllers and enclosures.

B. Qualifications

1. Manufacturer's Qualifications. Firms regularly engaged in manufacture of motor controllers of types and sizes required, whose products have been in satisfactory use in similar service for not less than 10 years.
2. Installer's Qualifications. Firm with at least 5 years of successful installation experience with projects utilizing motor controller work similar to that required for this project.

C. Factory Test

1. Variable Frequency Drives (VFD).
  - a. All control printed circuit boards shall be dynamically tested for a minimum of 22 hours while heat cycled 1 hour at each temperature setting from 32 degrees Fahrenheit (° F.) to 140° F.
  - b. All controllers shall be subjected to Run-In Test with a properly sized motor and operated under cycling load conditions on a dynamometer. The controller shall be subjected to a Run-In Test that brings the controller to full rated temperature.
  - c. The manufacturer shall provide certified copies of the factory test reports prior to shipment.

1.04 SUBMITTALS

- A. Submit the following in accordance with conditions of Contract and Division 1 specification sections:
1. Product Data. Submit manufacturer's data and installation instructions on motor controllers. Include enclosure details which consist of exterior and interior front door with nameplate legends, interior door front and rear views and terminal block layout.
  2. Wiring Diagrams. Submit power and control wiring diagrams for motor controllers showing connections to electrical power panels, feeders, and equipment. Control wiring diagrams shall be in ladder logic form. Differentiate between portions of wiring which are manufacturer installed and portions which are field installed.
  3. Motor Overloads. Submit for approval motor overload sizes for each new motor starter furnished or existing motor starter modified. Overload size shall be based on actual motor nameplate data and power factor correction size where applicable. Submit for approval motor overload sizing criteria, manufacturer, support calculations, motor nameplate data, capacitor nameplate data, and manufacturer tables used.

Include thermal overload compensation sizing information where motor(s) are operated at temperatures different than the motor controller(s).

4. Maintenance Data. Submit maintenance data and parts list for each motor controller and component, including "troubleshooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual.
5. Test Equipment Data. Submit make, model, and performance specifications of testing equipment to be utilized for measuring harmonic distortion and power factor as required under Part 3 of this specification.
6. Harmonic Analysis. Submit a harmonic analysis of the installation to document compliance with IEEE 519-1992, "General Distribution Systems." The analysis shall include electrical one line drawings defining the resistance and impedance of each wire run and transformer leading to each adjustable frequency controller. Provide a computer generated Fourier analysis of the system and list the current and voltage amplitudes and phase angles of all harmonics up to the 25th harmonic at the point of common coupling (PCC). A summary shall detail the percent THD for voltage and current.

#### 1.05 JOB CONDITIONS (NOT USED)

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver motor controllers and components properly packaged in factory fabricated type containers.
- B. Store motor controllers and components in original packaging and in a clean dry space; protect from weather and construction traffic.
- C. Handle motor controllers and components carefully to avoid breakages, impacts, and denting and scoring finishes. Do not install damaged equipment; replace and return damaged units to equipment manufacturer.

#### 1.07 SPECIAL WARRANTY (NOT USED)

#### 1.08 SEQUENCING AND SCHEDULING

- A. Coordination. Coordinate with other electrical work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of motor controllers with other work.
- B. Sequencing. Sequence motor controller installation work with other work to minimize possibility of damage and soiling during remainder of construction period.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Manufacturers. Subject to compliance with requirements, provide motor controllers by the following:

The following shall be selected as the Base Bid:

1. Allen Bradley
2. General Electric Co.
3. Siemens
4. Toshiba
5. Danfoss

The following will be considered as an Alternate Deduct:

6. Eaton, Cutler Hammer

- B. The Contractor shall coordinate the shop drawing submittal, procurement of the transformer, and delivery time frame so that the installation is complete and fully operational prior to the substantial completion date in the Contract. Base Bid should be based on best price that meets the requirements of the specifications.

## 2.02 MATERIALS

- A. General. Except as otherwise indicated, provide motor controllers and ancillary components which comply with manufacturer's standard materials, design, and construction in accordance with published product information, and as required for a complete installation.
- B. Variable Frequency Drive (VFD).
1. Variable frequency drive shall be listed by Underwriters Laboratories (UL).
  2. Construct the drive with three major sections: a full wave, 3 phase diode rectifier section to convert from alternating current (ac) to direct current (dc), a dc filter section to smooth the dc voltage, and a pulse width modulated IGBT 3 phase inverter section to provide a variable voltage, variable frequency output at a constant voltage to frequency ration. The output frequency range shall be a minimum of 6 to 120 hertz (Hz).
  3. VFD's of greater than 100 hp shall be 18 pulse design as indicated on the drawings and shall be required to meet input voltage and current harmonic distortion limits at PCC.
  4. General:
    - a. Pump applications, constant torque.
    - b. Motor type – standard NEMA design B.
    - c. The controller shall not require an isolation transformer, even if motors are located in a damp area.
    - d. All components shall include original manufacturer's identification and part number.
    - e. High power factor input with minimal line distortion, notching or harmonics.
    - f. Basic drive design shall be pulse width modulated with carrier frequency adjustable to 10 KHZ.
    - g. The controller shall comply with Federal Communications Commission requirements under Part 15 Rules for Radio Frequency Interference and IEEE 519 for 5% (voltage and current) maximum harmonics with 18 pulse drives.
    - h. All controllers shall be subjected to a 22-hour burn in test.
  5. Environmental
    - a. Ambient operating temperature range – 10 to 40° C.
    - b. Humidity: 5 to 95%, non-condensing.
    - c. Altitude: 0 to 3300 feet above sea level.
  6. Electrical
    - a. Input line voltage: 480 volts, 3-phase, 60 Hz, within  $\pm$  10% voltage fluctuations.

- b. Motor nameplate voltage: 460 volts (+/- 10% fluctuations), 3-phase, 60Hz.
  - c. Output frequency range: 0 to 320 Hz.
  - d. Minimum drive efficiency: 95% at 100% speed.
  - e. Current rating: Continuous 115% of connected motor's actual full load ampere (output rated current) at full speed.
  - f. Overload rating: 150% for constant torque at 1 minute.
  - g. Input line fuses.
  - h. External control circuit voltage: 120 V AC, maximum.
7. The controller shall include the following protective features with status indicators:
- a. Overvoltage.
  - b. Undervoltage.
  - c. Overcurrent.
  - d. Ground fault.
  - e. Over temperature.
  - f. Phase loss/blown fuse.
  - g. Running overload protection.
  - h. Common alarm contact for external user.
  - i. Line power circuit breaker.
  - j. Line power fuses.
  - k. Both the line power breaker and fuses shall be sized as shown on contract drawings.
8. The power circuit design shall be such that the following conditions will not damage the drive:
- a. Single or three-phase fault from line-to-line or line-to-ground.
  - b. Opening of all three phases during operation by disconnect switch at motor location.
9. Indicator light safety feature shall indicate when DC bus is energized and capacitors are charged.
10. Internal calibration adjustments: Digital keypad and display module shall provide parameter settings, adjustment and monitoring of control functions and faults. Display messages shall be in English.
- a. Minimum speed.
  - b. Maximum speed.
  - c. DC boost.
  - d. Acceleration/deceleration rates.
  - e. Stop mode (ramp or coast).
  - f. Automatic restart after fault trip with lockout after five attempts to restart.

- g. Anti-windmilling adjustable brake time.
  - h. Adjustable volts/Hertz.
11. Unit mounted operator controls:
    - a. Hand-Off-Auto switch.
    - b. VFD-Bypass selector switch.
    - c. Speed adjustment potentiometer.
    - d. Indicating speed meter.
    - e. Power ON and OFF lights.
    - f. VFD & Bypass lights.
    - g. VFD fail light.
    - h. Motor high temp light.
    - i. Additional operator controls and alarm lights as shown on the drawings.
  12. Provision for remote external controls:
    - a. Two wire ON-OFF control.
    - b. Speed adjustment, analog input (4-20 MADC).
    - c. Speed select, local-remote selector switch.
    - d. Ethernet port for communication with the plant wide SCADA.
  13. Interlocks
    - a. The unit shall input motor winding high temperature alarm. Upon activation of alarm, the pump shall stop. The pump shall automatically reset when alarm is removed.
    - b. Where other process alarms (high pressure, temp, vibration, etc.) are connected to the VFD, the unit shall shutdown after a field adjustable time delay with a lockout function. Refer to wiring diagrams for additional interlock and device requirements.
  14. Bypass
    - a. Provide heavy duty solid-state bypass starters for the selected VFDs as shown on the electrical one-line drawings.
    - b. All contactors used in the bypass operation shall be NEMA rated.
  15. Short Circuit Ratings:
    - a. 30KAIC (MIN.), RMS, SYM for the complete VFD/Bypass assembly.
- C. Bypass Solid State Reduced Voltage Starter.
1. Solid-state starter shall be listed by Underwriters Laboratories (IUL).
  2. Construct controllers with silicon controlled rectifiers (SCRs) for controlling motor voltages during acceleration. Provided on-board diagnostics with light emitting diodes (LEDs) indicated fault conditions.
  3. General:
    - a. Pump applications, constant torque.

- b. Motor type – standard NEMA design B.
  - c. The solid-state controller shall be a heavy duty, rugged 6-SCR device fully rated for 50° C. Heat sinks or other power section components shall be housed in the same enclosures with controller.
  - d. The starter control shall be microprocessor-based.
  - e. All components shall include original manufacturer’s identification and part number.
  - f. The controller shall comply with NEMA ICS-2-23-0 and IEEE Std. 472 for noise and RF immunity.
  - g. Fully rated metal oxide varistors (MOVs) and RC snubbers shall be provided for transient protection.
  - h. Input isolation magnetic contractor.
  - i. Pump Control: This function shall be used to reduce surges in pumping system during starting or stopping of pump by smoothly accelerating and decelerating the motor. The microprocessor shall analyze the motor variables and shall generate control commands, which will control the motor in such a way to reduce the possibility of surges occurring in the system. Starting time shall be adjustable from 2 to 30 seconds; stopping shall be adjustable from 2 to 120 seconds. Both starting time and stopping time shall be independently adjustable.
  - j. Shorting Contractors: Internal contractor shall be provided to allow cross the line operation when the pump reaches full speed. At full speed condition the SCR’s will remain in standby mode, operating in parallel with the contractor. Open circuit transition between SCR’s and contractor shall not be acceptable for providing this function.
4. Environmental:
- a. Ambient operating temperature range – 10 to 40° C.
  - b. Humidity: 5 to 95 %, non-condensing.
  - c. Altitude: to 3,300 feet above sea level.
5. Electrical:
- a. Input line voltage: 480 volts, 3-phase, 60 Hz within  $\pm 10\%$  voltage fluctuations.
  - b. Motor nameplate voltage: 460 volts, 3-phase, 60 Mz, horsepower as indicated on the Drawings.
  - c. Overload capability: 400% for minimum of 30 seconds.
  - d. Minimum peak inverse voltage (P.I.V.): 1,400 at 480 V.
6. The unit shall include the following protective features with status indicators.
- a. Overvoltage.
  - b. Under voltage.
  - c. Overcurrent.
  - d. Shirted SCR.
  - e. Over temperature.

- f. Phase loss/blown fuse.
  - g. Running overload protection.
  - h. Common alarm contact for external use.
7. The power circuit design shall be such that the following conditions will not damage the unit.
    - a. Single or three-phase fault form line-to-line or line-to-ground.
    - b. Opening of all three phases during operation by disconnect switch at motor locations.
  8. Internal calibration adjustments:
    - a. Initial torque.
    - b. Acceleration ramp.
    - c. Deceleration ramp.
    - d. Pump status day contacts for external use.
  9. Unit mounted operator controls:
    - a. Hand-off-Auto switch.
    - b. Power ON light
    - c. Pump ON/OFF lights
    - d. Fault indicating lights
    - e. Additional operator controls and devices as shown on the drawings.
  10. Refer to wiring diagrams for additional interlocks and device requirements.
  11. Short circuit ratings:
    - a. 30KAIC (MIN.), RMS, SYM.

D. Enclosures

1. Controllers shall be mounted inside NEMA 1/12 enclosure as indicated on the drawings.

E. Harmonic Distortion Requirements

1. Harmonic distortion due to the individual Variable frequency drive or solid-state reduced voltage controllers and the total load of all the VFD or solid-state reduced voltage controllers shall not exceed the requirements of IEEE 519-1992. The PCC shall be the bus of the motor control center feeding the controllers.
2. The maximum allowable current distortion limits shall be as recommended in Table 10.3, "Current Distortion Limits for General Distribution Systems," in IEEE 519-1992. The available short circuit current at the PCC shall be defined as the maximum short circuit current available at the motor control center feeding the controller. Loads not connected to the same bus defined as the PCC shall not be considered in the evaluation.
3. Under normal operating conditions when minimum of one VFD of each set of two pumps are operating, the line harmonics introduced into the power system from AC drives for both voltage and current shall be within the limits as defined in IEEE-519 (1992 edition).

4. The maximum allowable total harmonic distortion (THD) of the voltage and current at the PCC shall not exceed 5 percent.
5. The power factor (displacement and normal) at full load shall be greater than or equal to 92 percent lagging for each unit.

## 2.03 EXTRA MATERIALS

- A. Maintenance Stock, Fuses. For types and ratings required, furnish additional fuses, amounting to one unit for every installed unit.
  1. 1 (or 1 per 10 whichever is greater) of each size and type of push buttons and selector switches.
  2. 1 (or 1 per 10 whichever is greater) of each size and type of contact blocks.
  3. 1 (or 1 per 10 whichever is greater) of each size and type of pilot lights and illuminated buttons.
  4. 10 (or 1 per 10 whichever is greater) of each size and type of lamp.
- B. Provide one spare VFD operator interface for each type provided by each vendor (minimum one per vendor).
- C. Provide one spare main control board for every three VFD provided by each vendor (minimum one per vendor).

## 2.04 EQUIPMENT/SYSTEM IDENTIFICATION

- A. Provide equipment/system identification nameplates complying with Section 26 05 53, "Electrical Identification," in accordance with utilization equipment name and its location. Tags shall be engraved plastic laminate.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. General. Examine areas and conditions under which motor controllers are to be installed, and notify the Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- B. Miscellaneous
  1. Install motor controllers where indicated, in accordance with equipment manufacturer's written instructions and with recognized industry practices, complying with applicable requirements of NEC, UL and NEMA standards, to ensure that products fulfill requirements.
  2. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and B, and the NEC.
  3. Install fuses of sizes indicated in each fusible disconnect switch.
  4. Wall mount the enclosures using spacers or standoffs (1/4 inch minimum).
  5. Provide auxiliary motor starter, overload and H-O-A selector switch contacts as required. Verify wiring supplied of control circuit is per elementary diagrams provided.



6. Pay for the services of the VFD manufacturer's employed field service engineer to assist in the installation and start up of the VFD's. The field service personnel shall be factory trained with periodic updates and have experience with the same model of VFD as on the job site.

### 3.02 FIELD QUALITY CONTROL

#### A. General

1. Prior to energization of motor controller equipment, check with ground resistance tester, phase-to-phase and phase-to-ground insulation resistance levels to ensure that requirements are fulfilled.
2. Prior to energization, check circuitry for electrical continuity and for short circuits.
3. Ensure that direction of rotation of each motor fulfills requirements.

#### B. VFD Testing

1. Testing shall be witnessed by the Owner/Engineer. The Owner/Engineer shall be notified at least 7 days in advance of testing. The current and voltage harmonic distortion and power factor shall be monitored at the motor control center feeding the controller being tested with a BMI Model 3030 harmonic analyzer or equal. The field tests shall be performed by an independent testing organization. Submit the experience record of the test organization for approval by the Engineer and a plan for the on-site tests. Data shall be collected for each motor at rated load and speed with all motors on the local bus running at rated load and speed. Sufficient data shall be collected to prepare a report to compare the harmonic content of the system to the calculated values in the analysis submitted in accordance with subpart 1.4, paragraph A.6 of this specification.

### 3.03 GROUNDING

- A. Provide equipment grounding connections for motor controller equipment and enclosure as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounding.

### 3.04 ADJUSTING AND CLEANING

- A. Adjust operating mechanisms, where necessary, for free mechanical movement.
- B. Touch up scratched or marred enclosure surfaces to match original finishes.

### 3.05 DEMONSTRATION

- A. Upon completion of installation of motor controller equipment and electrical circuitry, energize controller circuitry and demonstrate functioning of specified features on each equipment item in accordance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and retest to demonstrate compliance.

### 3.06 TRAINING

- A. Provide one day of on-site training for the plant's staff on variable frequency drives and solid-state starters. The training shall be conducted by the factory-trained instructor or field engineer.

END OF SECTION

## SECTION 26 43 01

### TRANSIENT VOLTAGE SURGE SUPPRESSION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections apply to this section.
  - 1. Section 26 24 13 "Switchboards" for factory-installed TVSSs.
  - 2. Section 26 24 19 "Motor Control Centers" for factory installed TVSSs.
  - 3. Section 26 24 16 "Panelboards" for factory-installed TVSSs.

##### 1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and material necessary to install TVSSs in accordance with the plans and as specified herein.
- B. Extent of TVSS work is indicated on the drawings.
- C. Definitions
  - 1. TVSS. Transient voltage surge suppressor.

##### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with TVSSs in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. TVSSs shall be manufactured, tested, and installed in accordance with the requirements of the following standards.
  - 1. American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE).
    - a. C62.11-1999, "Standard for Metal Oxide Surge Arresters for AC Power Circuits."
    - b. C62.41.1-2002, "Guide on the Surge Environment in Low-Voltage (1000V and Less) AC Power Circuits."
    - c. C62.41.2-2002, "IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits."
    - d. C62.45-2002, "Guide on Surge Testing for Equipment Connected to Low-Voltage (1000V and Less) AC Power Circuits."
  - 2. National Electrical Manufacturers Association (NEMA) LS-1 1992, "Low Voltage Surge Protective Devices."
  - 3. National Fire Protection Association (NFPA).
    - a. NFPA 70-2005, "National Electrical Code."
    - b. NFPA 75-2003, "Protection of Electronic Computer/Data Processing Equipment."
    - c. NFPA 780-2004, "Standard for the Installation of Lightning Protection Systems."

4. Underwriters' Laboratories, Inc. (UL).
  - a. UL 94-1996, "Tests for Flammability of Plastic Materials."
  - b. UL 746-B-1996, "Polymetric Materials Long-Term Property Evaluations."
  - c. UL 1283-1998, "Electromagnetic Interference and Radio Interference Filters."
  - d. UL 1449-1996, "Transient Voltage Surge Suppressors."

C. Compliance

1. TVSSs shall be tested, listed, and labeled by UL.
  - a. Units shall bear the UL 1449 listing as a TVSS and the UL 1283 listing as an electromagnetic interference filter.
  - b. Units shall have a UL-listed short circuit current rating (SCCR) equal to or greater than the equipment to which they are connected or equal to or greater than the fault current available on the system at the point to which they are connected, whichever is greater.
2. TVSSs shall be identified and labeled for the location category for which they are designed, as defined in IEEE Standard C62.41.
3. TVSSs shall successfully pass the life cycle tests prescribed in ANSI/IEEE C62.41.
4. Factory Prototype Tests. Each design configuration shall have the following tests, for which certified documents shall be submitted.
  - a. Single-pulse surge current capacity test in accordance with NEMA LS-1, utilizing one ANSI/IEEE C62.41 Category C1 surge to benchmark the unit's suppression voltage, followed by a second Category C1 surge to verify that the unit suppression voltage does not vary more than 10 percent from that of the benchmark surge.
  - b. Minimum repetitive surge current capacity test, utilizing one ANSI/IEEE C62.41 Category C1 surge to benchmark the unit's suppression voltage, followed by a repetitive number of ANSI/IEEE C62.41 Category C3 surges, followed by a second Category C1 surge, to verify that the unit suppression voltage does not vary more than 10 percent from that benchmark surge.
  - c. Duty cycle test to obtain the UL 1449 suppression voltage rating shall be performed on a prototype unit by UL utilizing their standard duty cycle testing procedures.
- D. Source Limitations. Obtain TVSSs and accessories through one source from a single manufacturer.
- E. Electrical Components, Devices, and Accessories. Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.04 SUBMITTALS

- A. Product Data. For each type of product proposed. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.
- B. Product Certificates. For TVSSs, signed by product manufacturer certifying compliance with the following standards.
  1. UL 1283.

2. UL 1449.
  3. NEMA L-S1.
- C. Operation and Maintenance Data. For TVSSs to include in operation and maintenance manual.
- 1.05 JOB CONDITIONS (NOT USED)
- 1.06 DELIVERY, STORAGE, AND HANDLING
- A. Deliver TVSSs properly packaged in factory-fabricated-type containers or wrappings, which properly protect devices from damage.
  - B. Store TVSSs in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping. Maintain storage temperatures within the limits of -40° F. to 185° F.
  - C. Handle surge TVSSs carefully to prevent physical damage. Do not install damaged equipment. Remove from site and replace damaged devices with new.
- 1.07 SPECIAL WARRANTY
- A. Special Warranty. Manufacturer's standard form in which manufacturer agrees to repair or replace components of TVSSs which fail in materials or workmanship within 5 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Available Manufacturers. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
  1. Cutler-Hammer, Inc.; Eaton Corporation.
  2. General Electric Company.
  3. Liebert Corporation; a Division of Emerson.
  4. Siemens Energy & Automation, Inc.
  5. Square D; Schneider Electric.

### **2.02 SERVICE ENTRANCE SUPPRESSORS**

- A. Service entrance TVSS shall be installed as an integral part of proposed switchboard.
- B. TVSS Description. Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories.
  1. Fuses, rated at 200-kiloampere (kA) interrupting capacity.
  2. Fabrication using bolted compression lugs for internal wiring.
  3. Integral circuit breaker disconnect.
  4. Arrangement with wire connections to phase bus, neutral bus, and ground bus.
  5. LED indicator lights for power and protection status.
  6. Audible alarm, with silencing switch, to indicated when protection has failed.

- 7. One set of dry contacts rated at 5 A and 250 Vac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
- C. Peak Single-Impulse Surge Current Rating. 240kA per phase.
- D. Connection Means. Direct bus.
- E. Protection modes and UL 1449 second edition SVR for grounded wye circuits with voltages of 480Y/277, 3-phase, 4-wire circuits shall be as follows.
  - 1. Line to Neutral. 800 V
  - 2. Line to Ground. 800 V
  - 3. Neutral to Ground. 800 V
  - 4. Line to Line. 1800V

2.03 PANELBOARD SUPPRESSORS

- A. TVSS Description. Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories.
  - 1. Fuses, rated at 200-kA interrupting capacity.
  - 2. Fabrication using bolted compression lugs for internal wiring.
  - 3. Integral circuit breaker disconnect.
  - 4. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
  - 5. LED indicator lights for power and protection status.
  - 6. Audible alarm, with silencing switch, to indicate when protection has failed.
  - 7. One set of dry contacts rated at 5 A and 250 Vac for remote monitoring of protection status. Coordinate with building power monitoring and control system.
- B. Peak Single-Impulse Surge Current Rating. 80kA per phase.
- C. Protection modes and UL 1449 second edition SVR for grounded wye circuits with voltages of 208Y/120V, 3-phase, 4-wire circuits shall be as follows.
  - 1. Line to Neutral. 400V
  - 2. Line to Ground. 400 V
  - 3. Neutral to Ground. 400 V
- D. EMI/RFI Filter. Minimum filter noise attenuation shall be as follows.

Frequency	Attenuation
50 kHz	32 db
100 kHz	50 db
1 MHz	39 db
10 MHz	46 db
100 MHz	38 db

## 2.04 MOTOR CONTROL CENTER SUPPRESSORS

- A. TVSS Description. Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories.
  - 1. Fuses, rated at 200-kiloampere (kA) interrupting capacity.
  - 2. Fabrication using bolted compression lugs for internal wiring.
  - 3. Integral circuit breaker disconnect.
  - 4. Arrangement with wire connections to phase bus, neutral bus, and ground bus.
  - 5. LED indicator lights for power and protection status.
  - 6. Audible alarm, with silencing switch, to indicated when protection has failed.
  - 7. One set of dry contacts rated at 5 A and 250 Vac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
- B. Peak Single-Impulse Surge Current Rating. 120kA per phase.
- C. Connection Means. Direct bus.
- D. Protection modes and UL 1449 second edition SVR for grounded wye circuits with voltages of 480Y/277, 3-phase, 4-wire circuits shall be as follows.
  - 1. Line to Neutral. 800 V
  - 2. Line to Ground. 800 V
  - 3. Neutral to Ground. 800 V
  - 4. Line to Line. 1800V.

## 2.05 ENCLOSURES

- A. NEMA 250 with type matching the enclosure of panel or device being protected.

## PART 3 - EXECUTION

### 3.01 INSTALLATION OF TVSS

- A. Install TVSS at service entrance on load side, with ground lead bonded to service entrance.
- B. Provide integral TVSSs for proposed switchboards, panelboards, and motor control centers where indicated on the drawings.

### 3.02 FIELD QUALITY CONTROL

- A. Testing. Perform the following field tests and inspections and prepare test reports.
  - 1. .
  - 2. Complete start-up checks according to manufacturer's written instructions.
  - 3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" section. Certify compliance with test parameters.
- B. Remove and replace malfunctioning units and retest as described above.

END OF SECTION

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**SECTION 40 05 13**  
**PROCESS PIPING, GENERAL**

**PART 1 GENERAL**

1.1 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1; Section 40 05 14, "Process Piping, Accessories"; and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Scope of Work. Provide the labor, tools, equipment, and materials necessary to furnish and install the process piping in accordance with the drawings and as specified herein. This section, in conjunction with the corresponding process piping material sections, is intended to cover the supply and installation of all exposed (non-buried) process piping. This work shall also include all pipe supports and restraints, fittings, joints, testing, cleaning, and work on existing exposed process piping.

1.3 QUALITY ASSURANCE

- A. Codes and Regulatory Agencies. Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. Standards. All materials, testing, and workmanship shall be in conformance with the following standards and as referenced herein.
  - 1. ANSI – American National Standards Institute.
  - 2. ASME – American Society of Mechanical Engineers.
  - 3. ASTM – American Society for Testing and Materials.
  - 4. AWWA – American Water Works Association.
  - 5. NSF – National Sanitary Foundation.

1.4 SUBMITTALS

- A. General. Submit the specified submittal packages in accordance with Section 01 33 00, "Submittals" and the pipe material's specific specification section included later in this contract document.

1.5 JOB CONDITIONS

- A. General. Verify job conditions which may impact piping layouts and locations prior to ordering.
- B. Coordination
  - 1. Coordinate schedule of the work and the location of equipment and conduit to prevent interferences and delays.
  - 2. Coordinate type and materials (gaskets, glands, and bolts) of joints connecting to valves and equipment with the suppliers of each item.
- C. Field Dimensions. All piping shall be installed to field dimensions unless specifically stated on drawings.



1.6 DELIVERY, STORAGE, AND HANDLING

- A. General. The delivery, storage, and handling of the process piping and accessories shall be in accordance with Section 01 60 00, "Materials and Equipment," and the manufacturer's instructions.
- B. Handling. Handle all pipe, fittings, and accessories carefully using proper handling devices. Do not insert lifting devices into barrels of pipe.
- C. Storage. Store pipe and fittings on wood blocking or platforms to avoid contact with ground. Keep pipe free from dirt and foreign matter. Plastic and fiberglass-reinforced plastic (FRP) piping shall be shaded but not covered directly to allow air circulation and reduce heat build-up due to direct sunlight.

1.7 SPECIAL WARRANTY (NOT USED.)

**PART 2 PRODUCTS**

2.1 GENERAL

- A. Pipe and Fittings. All process piping, fittings, and joints shall conform to the drawings and requirements specified in the corresponding section for each type of pipe installed.
- B. Manufacturer. All new process piping of one material shall be by a single manufacturer. All process fittings of one material shall be by a single manufacturer. All pipe and fittings manufactured outside the United States shall be certified to ISO 9001:2000 standards for quality assurance.
- C. Identification
  - 1. All pipe and fittings 4 inches in diameter and larger shall have the pipe size, material, and class or schedule painted or cast on the exterior pipe surface.
  - 2. All piping less than 4 inches in diameter shall have the pipe size, material, and class or schedule factory marked on the exterior pipe surface.

2.2 JOINTS

- A. Flanged
  - 1. Standard. Conform to ANSI/AWWA C115/A21.15 or ANSI/ASME B16.1, Class 125, unless otherwise noted on the drawings.
  - 2. Gaskets. All joints for 12 inches and smaller shall include 1/8-inch-thick full-face SBR red rubber gaskets unless noted otherwise. All joints for pipe 14 inches and larger shall include 1/8-inch-thick full-face synthetic rubber gaskets with one or more annular rings. Gaskets shall conform to ANSI/AWWA C111/A21.11 and be rated to for a minimum of 170° F unless noted otherwise. All gasket types shall be suitable for the process material being conveyed.
    - a. Air and gas piping shall have high temperature type gaskets, rated to 300° F. Material shall be fluoroelastomer (FKM).
  - 3. Bolts.

- a. Non-submerged Service. Bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions conforming to ANSI B18.2.1 and ANSI/ASME B18.2.2. For bolts of 1-3/4-inch diameter and larger, bolt studs with a nut on each end are recommended. Material for nuts and bolts shall conform to ASTM A 307, Grade B.
  - b. Submerged Service. Bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions, all as specified in ANSI B18.2.2, "Square and Hex Nuts Inch Series." For bolts 1-2/4 inches in diameter and larger, bolt studs with a nut on each end are recommended. Material for bolts and nuts shall be Type 316 stainless steel. Utilize anti-seize compound on all nuts.
- B. Threaded
- 1. Standard. Pipe threads shall conform to American Standard Taper Pipe thread ANSI B2.1.
  - 2. Preparation. Threaded joints shall include a Teflon tape for sealant purposes.
- C. Grooved and Shouldered
- 1. Standard. Conform to AWWA C606 unless otherwise noted on the drawings.
  - 2. Couplings shall be ductile iron.
  - 3. Gaskets. Gaskets shall conform to the same material requirements as the flanged joints.
  - 4. Bolts. Bolts and nuts shall conform to the same material requirements as the flanged joints.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Inspection
- 1. All pipe shall be inspected for damage resulting from shipping and handling. Reject and replace all damaged pipe and fittings with a new piece at the Contractor's expense.
  - 2. If any defective pipe or fitting is discovered after installation, remove and replace defective piece with a sound piece at the Contractor's expense.
  - 3. All pipe and fittings shall be kept clean until they are accepted in the completed work.

#### **3.2 INSTALLATION**

- A. General. Installation of all process piping shall be in accordance with manufacturer's instructions, approved shop drawings, drawings, and as specified herein.
- 1. Use of flange adapters and flanges, or flexible couplings, shall be acceptable only where shown on the approved dimensional layouts or drawings.

2. Conflicts between the specifications or drawings and the manufacturer's instructions shall be brought to the Engineer/Architect's attention and a solution documented by Field Order.
- B. Cutting
1. Pipe cutting shall be neat, smooth, at right angles to the axis of the pipe, and without damage to the pipe, coating, or lining.
  2. Flame cutting will not be permitted.
  3. Ream all pipes and tubing to full inside diameter after cutting. Remove sharp edges on cut ends. Remove all cuttings from inside the pipe before installation.
- C. Alignment
1. Install straight runs true to line and elevation and vertical pipe plumb in all directions.
  2. Install parallel or perpendicular to building walls unless shown otherwise on the drawings.
  3. Piping without specific locations or elevations indicated shall be located to avoid obstructions and shall not obstruct corridors, walkways, equipment areas, or work areas. A minimum headroom clearance of 7 feet 6 inches shall be provided under all piping unless otherwise noted.
- D. Temporary Caps. Provide temporary caps or plugs at all pipe openings at the end of each day's work and where otherwise requested by the Engineer/Architect.
- E. Pipe Supports, Hangers, and Blocking. Furnish and install, whether shown on the drawings or not, all required supports, hangers, and blocking.
1. Design, and provide a complete system of pipe supports with inserts, bolts, nuts, restraining and hanger rods, washers, miscellaneous steel, sliding Teflon plate, and accessories as indicated or specified. The term pipe support included hangers, guides, restraints, anchors, and saddles. Provide all support systems and the design of all support systems for all piping as specified herein.
  2. The Contractor shall provide pipe support locations, configurations, and details in accordance with approved shop drawing submittals.
  3. The Contractor shall be responsible for the proper design, fabrication, location, shop drawings, and installation of all pipe supports in accordance with the specified requirements.
  4. Spacing of supports and hangers shall be as shown on the drawings, and in no instance exceed the manufacturer's recommendations for the type and class of pipe and temperature of liquid being carried.
  5. Pipe hangers shall be provided at all bends and tees, and on either side of all valves.
  6. Pipe supports, hangers, and thrust blocks shall be of the size, shape, and quantities as shown on the drawings or as required.
  7. Thrust blocking shall be provided at all bends and tees, where changes in pipe diameter occur at reducers or in fittings, at all dead ends, and at

pipes which are tapped or plugged.

8. All proposed hangers, supports, and blocking must be approved before placement.

F. Pipe Fittings

1. Unions. Unions shall be provided where shown on the drawings, and at the following locations:
  - a. Downstream of each screwed end valve.
  - b. Screwed or flanged union at each piece of equipment.
  - c. Dielectric unions where dissimilar metals are connected except at bronze or brass valves installed in ferrous piping.
  - d. Where necessary to install or dismantle piping.
2. Reducers. Eccentric reducers shall be installed where reducers are shown and where air or water pockets would occur in mains because of reduction in pipe size.
3. Transitions. Provide all necessary adapters, specials, and connector pieces when connecting different type and sizes of pipe, connecting pipe by different manufacturers, or connecting to equipment, valves, or meters.

G. Joints

1. Flanged.
  - a. Clean. Flange faces shall be clean. Hexagonal bolts and nuts shall be clean and lubricated.
  - b. Alignment. Joints shall be fitted so that contact faces bear uniformly on the gasket and are made up with uniform bolt stress.
  - c. Assembly. Assemble joints without forcing.

3.3 FIELD QUALITY CONTROL

- A. Testing. All process piping shall be tested for leaks in accordance with Section 01 89 19, "Leakage Test and Disinfection." Visible leakage will not be accepted in exposed piping. If the test fails, repair or replace the piping and retest.
- B. Cleaning. All process piping shall be thoroughly cleaned and flushed prior to placing in service in a manner acceptable to the Engineer/Architect. Piping shall be inspected and all debris, dirt, and foreign matter removed. Disinfection shall be done in accordance with Section 01 89 19, "Leakage Test and Disinfection."

END OF SECTION

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**SECTION 40 05 13.13**  
**PROCESS PIPING, CARBON STEEL**

**PART 1 GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; Section 40 05 13, "Process Piping, General"; and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Provide the labor, tools, equipment, and materials necessary to modify the carbon steel process piping in accordance with the drawings and specifications.
- B. Cut the existing 24" Finished Water header and remove a section of existing steel pipe to modify piping. Modifications include installation of a new 24" flanged butterfly valve.
- C. Furnish and install flange connections to connect the new valve to the existing pipe.
- D. Furnish and install two pipe restraint tabs to be field welded to the existing steel pipe. Install two threaded rods with hardware to restrain the pipe by spanning between the tabs of the pipe and the flange of the new butterfly valve.

1.3 QUALITY ASSURANCE

- A. In accordance with Section 40 05 13, Process Piping, General.

1.4 SUBMITTALS

- A. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. Submittal Package No. 1 – Shop Drawings and Product Data
  - 1. No piping or fittings shall be delivered or installed before this submittal package has been reviewed and approved. Shop drawings and product data shall include:
    - a. Illustrated product data. Submit the product data of the pipe, fittings, manufacturer's name, pipe material, size, class, and gaskets specified in the drawings.
    - b. Submit the manufacturer's recommended maximum unsupported length of the size piping specified.
    - c. Affidavit of compliance and certification of design and performance.
    - d. Information on field and installation requirements, including mounting and access requirements and total weight of each component and each complete assembly.
    - e. Description of proposed test methods, procedures, and apparatus.
    - f. Coatings and linings.
- C. Submittal Package No. 2 – Layout Drawings

1. No piping or fittings shall be delivered or installed before this submittal package has been reviewed and approved. Layout drawings shall include:
  - a. Submit detailed plan and profile drawings showing details of piping, fittings, end connections, valve locations, and locations of all flanged joints.
  - b. Piping supports, hangers, and thrust block type and locations.

1.5 **JOB CONDITIONS**

- A. In accordance with Section 40 05 13, Process Piping, General.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. In accordance with Section 40 05 13, Process Piping, General.

1.7 **SPECIAL WARRANTY (NOT USED.)**

**PART 2 PRODUCTS**

2.1 **CARBON STEEL PIPE**

- A. Pipe. Steel pipe shall conform to American Society for Testing and Materials (ASTM) A 53, Schedule 40. Pipe ends shall be grooved in accordance with American National Standards Institute/American Water Works Association (ANSI/AWWA) C-606.
- B. Fittings. Fittings shall be ductile iron conforming to ASTM A 356, Grade 65-45-12, forged steel conforming to ASTM A 234, or fabricated steel conforming to ASTM A 53 suitable for a minimum working pressure of 150 pounds per square inch (psi) and conforming to ANSI B16.3.
- C. Joints. All joints shall be welded, threaded, or grooved in accordance with Section 40 05 13, Process Piping, General. Welded joints shall conform to AWWA C206.
- D. Finishes. Coat exposed pipe not having insulation in accordance with Section 09 90 00, Painting. Line all steel pipe and fitting with a liquid epoxy coating that is NSF61 approved.

**PART 3 EXECUTION.**

3.1 **GENERAL**

- A. In accordance with Section 40 05 13, Process Piping, General.

END OF SECTION

**SECTION 40 05 13.33**  
**PROCESS PIPING, COPPER**

**PART 1 GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; Section 40 05 13, "Process Piping, General"; and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Scope of Work. Provide the labor, tools, equipment, and materials necessary to furnish and install the copper process piping.

1.3 QUALITY ASSURANCE

- A. General. In accordance with Section 40 05 13, Process Piping, General.

1.4 SUBMITTALS

A. General

- 1. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.

B. Submittal Package No. 1 – Shop Drawings and Product Data

- 1. Submit shop drawings and product data for review and approval. Do not deliver or install piping or fittings before this submittal package has been reviewed and approved. Shop drawings and product data shall include:
  - a. Illustrated Product Data. Submit the product data of the pipe, fittings, manufacturer's name, pipe material, size, class, and gaskets specified on the drawings.
  - b. The manufacturer's recommended maximum unsupported length of the size piping specified.
  - c. Affidavit of compliance and certification of design and performance.
  - d. Information on field and installation requirements, including mounting and access requirements and total weight of each component and each complete assembly.
  - e. Description of proposed test methods, procedures, and apparatus.
  - f. Coatings and linings.

1.5 JOB CONDITIONS

- A. General. In accordance with Section 40 05 13, Process Piping, General.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General. In accordance with Section 40 05 13, Process Piping, General.

1.7 SPECIAL WARRANTY (NOT USED.)

**PART 2 PRODUCTS**



## 2.1 MATERIALS

### A. Copper Pipe

1. General. All copper process piping shall comply with the following, unless otherwise noted on the drawings or herein.
  - a. Standard. ASTM B 88, Type L, hard drawn.
  - b. Joints. Soldered except at valves which may be flared or compression type.

### B. Joints

1. Soldered.
  - a. Standard. Comply with ASTM B 32.
  - b. Material. 95-5 tin antimony solder.
2. Press Tube Joint.
  - a. Viega ProPress, or Engineer approved equal.

### C. Fittings

1. Wrought Copper Solder Joint Fittings. ANSI/ASME B16.22, streamlined pattern.
2. Wrought Copper and Bronze Groove End Fittings. ASTM B 75 tube and ASTM B 584 bronze castings.
3. Press Tube Fittings. Viega ProPress, or Engineer approved equal.

## **PART 3 EXECUTION**

### 3.1 GENERAL

A. In accordance with Section 40 05 13, Process Piping, General.

### B. Hangers

1. Furnish and install isolators where dissimilar metals occur between the pipe and hangers.

END OF SECTION

**SECTION 40 05 18**  
**PROCESS PIPING, ACCESSORIES**

**PART 1 GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; Section 40 05 13, "Process Piping"; and all related specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Provide the labor, tools, equipment, and materials necessary to furnish and install the process piping accessories in accordance with the drawings and specifications.
- B. Corrosion resistant material for hardware used in buried or immersion service shall be 316 stainless steel or as specified. All other exposed hardware shall be hot-dipped galvanized steel unless specified otherwise. All fasteners shall be 316 stainless steel.

1.3 QUALITY ASSURANCE

- A. Standards. All materials, testing, and work performed shall be in conformance with the following standards as referenced herein:
1. ANSI – American National Standards Institute.
  2. ASTM – American Society for Testing and Materials.
  3. AWWA – American Water Works Association.
  4. MSS – Manufacturers Standardization Society of the Valve and Fittings Industry.

1.4 SUBMITTALS

- A. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. Submittal Package No. 1 – Shop Drawings and Product Data
1. No piping accessories shall be delivered or installed before this submittal package has been reviewed and approved. Shop drawings and product data shall include:
    - a. Illustrated product data.
    - b. Affidavit of compliance and certification of design and performance.
    - c. Information on field and installation requirements, including mounting and access requirements and total weight of each component and each complete assembly.
    - d. Description of proposed test methods, procedures, and apparatus.
    - e. Coatings and linings.

1.5 JOB CONDITIONS

- A. Coordinate work with that of other sections to provide proper combination of pipe size, core or sleeve size, and link size.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 40 05 13, "Process Piping."

1.7 SPECIAL WARRANTY (NOT USED.)

**PART 2 PRODUCTS**

2.1 PIPE SUPPORT

A. General

1. Furnish and install all necessary restraints, blocks, bracing, supports, or hangers, including all necessary miscellaneous steel, inserts, anchors, nuts, bolts, and concrete to support and anchor the piping as shown and required to prevent displacement, vibration, sagging, warping, or failure of the piping expansion and contraction.
2. Locate all supports in accordance with the piping manufacturer's recommendations.

- B. Standard. Pipe hangers shall be in accordance with MSS Standard Practice SP-58 unless noted otherwise.

- C. Types. The following types of pipe supports are acceptable.

1. Hanger Type.

- a. Adjustable Clevis. Clevis shall be carbon steel unless noted otherwise. Clevis shall be in compliance with MSS SP-69, Type 1.
- b. Trapeze. Universal trapeze assembly shall be carbon steel unless noted otherwise. Trapeze assembly shall be Anvil Figure 46, or equal.
- c. Structural Attachments.
  - 1) Welded Steel Bracket. MSS SP-69, Types 31, 32, and 33.
  - 2) Malleable Concrete Insert. MSS SP-69, Type 18.

2. Support Type.

- a. Pipe Saddle Support. MSS SP-69, Types 35, 36, and 38.
- b. Pipe Stanchion Saddle. MSS SP-69, Type 37.

3. Submit any additional pipe support required not listed above for review.

- D. Coatings. Conform to Section 09 90 00, "Painting."

1. Hot-dip-galvanize steel items at the factory unless otherwise noted.
2. Copper-plate steel or malleable iron materials used for support of copper piping.

2.2 CONCRETE PIPE SUPPORT

- A. Install concrete pipe support and thrust blocking as shown and where directed.

## 2.3 CORPORATION STOPS

- A. Install corporation stops where shown. Corporation stops shall be bronze body and ground key plug with AWWA C800 taper threaded inlet and outlet to match the connecting piping material.

## 2.4 FLANGED COUPLING ADAPTERS

- A. General. Flanged coupling adapters shall include a flanged end and a sleeve-type flexible coupling and meet the requirements of AWWA C219.
- B. Adapter Restraints. Harness adapters as required to restrain pressure piping.
  - 1. For 12 inches in diameter or less, harnessing shall be with 1/2-inch stainless steel anchor studs.
  - 2. For larger than 12 inches in diameter, harnessing shall be with a minimum of four corrosion resistant alloy steel bolts tied to adjacent flange or lugs on the pipe.
  - 3. Number of bolts or studs shall be according to manufacturer's recommendation.
- C. Construction
  - 1. The adaptors shall be cast iron or ductile iron.
  - 2. Bolts shall be of a corrosion resistant material.
  - 3. Gaskets. Provide resilient gaskets to cushion vibration and safely accommodate for pipe deflection or longitudinal pipe movement without leakage. Gaskets shall be suitable for the service of the pipe.
  - 4. Coating. Coatings shall be according to manufacturer's instructions and be suitable for the service of the pipe. Shop-prime and field-paint the joints in accordance with Section 09 90 00, "Painting."
- D. Service. Flanged coupling adapters shall be rated for the same pressure as the connected piping. See appropriate process piping specification sections for pipe pressure ratings.
- E. Manufacturer. Subject to compliance with the specifications, provide flanged coupling adapters from one of the following approved manufacturers.
  - 1. Smith Blair. Style 912.
  - 2. Dresser. Style 227.
  - 3. JCM. 301.
  - 4. ROMAC. 501.
  - 5. Ford Meter Box. Style FFCA.

## PART 3 EXECUTION.

### 3.1 GENERAL

- A. Install all piping accessories according to manufacturer's instructions, and as shown.

END OF SECTION

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**SECTION 40 05 23**  
**PROCESS VALVES**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Contractor shall provide the labor, tools, equipment, and materials necessary to furnish and install the valves and accessories in accordance with the drawings and as specified herein. Provide all valves required for complete functional systems.
- B. Flow Control Valve
  1. Owner will provide a new 24" DeZurik flanged butterfly valve that is currently in storage at the Service Building Warehouse for Contractor utilize for this project.
  2. Contractor shall install the valve in the Finish Water Header in Pump Gallery Lower Level after the existing piping has been modified as shown on the contract drawings.
  3. Contractor shall furnish and install a modulating actuator that will be mounted to the valve. Contractor shall coordinate with the actuator manufacturer to provide a stainless steel adaptor plate to allow the new AUMA actuator to be fitted to the DeZurik butterfly valve.
  4. After the valve is installed, electrical conduit and wiring shall be installed to provide power to the flow control valve and run signal wire back to the existing PLC as shown on the contract drawings.
  5. The actuator supplier shall provide startup services and assist with the testing and commissioning of the flow control valve.
  6. The SCADA integrator will be responsible for integrating the new actuator within the existing SCADA system and provide training on the operation of the flow control valve.

1.03 QUALITY ASSURANCE

- A. Codes and Regulatory Agencies. Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. Standards. Materials and workmanship shall be in accordance with the following standards as referenced herein:
  1. AGA - American Gas Association.
  2. ANSI - American National Standards Institute.
  3. ASME - American Society of Mechanical Engineers.
  4. ASTM - American Society for Testing and Materials.
  5. AWWA - American Water Works Association.
  6. IEC - International Electromechanical Commission.
  7. NEMA - National Electrical Manufacturers Association.

8. NSF - National Sanitation Foundation.

#### 1.04 SUBMITTALS

- A. Shop Drawings and Product Data. Shop drawings and product data for each type of valve shall be submitted to the Engineer/Architect for review. Shop drawings shall be in accordance with Section 01 33 00 and shall include:
  1. Manufacturer's name.
  2. Body, seating, and trim materials.
  3. Dimensions.
  4. Connection details.
  5. Required clearances.
  6. Parts list with materials and part numbers for the valves and accessories.
  7. Maximum operating pressure and temperature ratings.
  8. Operator torque calculations.
  9. Manufacturer's instructions.
  10. Electrical data when applicable.
- B. Test Reports
  1. Submit hydrostatic test reports as specified in this section.
- C. Operation and Maintenance Manuals. Operation and Maintenance (O&M) manuals shall be submitted to the Engineer/Architect in accordance with Section 01 33 00 of these specifications. The initial review copy of the O&M manual and the revised copies shall be submitted prior to delivery of the equipment.

#### 1.05 JOB CONDITIONS

- A. Flow control valve will be installed in existing 24" steel finished water header that will be modified for the valve to be installed during a maximum 8-hour outage coordinated and scheduled with the Owner.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General. The delivery, storage, and handling of the process piping valves and gates shall be in accordance with Section 01 60 00 and the manufacturer's instructions.
- B. Storage. Store valves under cover and out of direct contact with the ground.
- C. Handling. Handle valves to avoid damage. Valves which are cracked, dented, dropped, or otherwise damaged will not be accepted.

#### 1.07 SPECIAL WARRANTY (NOT USED.)

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL REQUIREMENTS

- A. Manufacturer
  1. Each type of valve shall be by only one manufacturer.
- B. Valve Ends

1. All joint materials shall be provided in accordance with the requirements for suitability to handle pressure, temperature, and chemical resistance for intended use and application.
2. All valves shall be joined to pipe with the following methods and materials:
  - a. Flanged joint materials are to be provided in accordance with Section 40 05 13, "Process Piping, General," paragraph 2.2 A.
  - b. Threaded. In accordance with Section 40 05 13, "Process Piping, General," paragraph 2.2 B.
3. Valves on exposed piping shall be as shown on drawings, usually with a symbol. Connections shown include:
  - a. Flanged. (FL) Valves shall be rated for 150 psi working pressure unless noted otherwise in the Valve Schedule or on the drawings. Flanges to match ANSI B16.5, Class 150 unless noted otherwise.
  - b. Screwed. National (tapered) pipe thread (NPT).
  - c. Socket. Conform to specifications for adjacent piping.
  - d. True Union. Conform to specifications for adjacent piping. True union ends shall be used for all polyvinyl chloride (PVC) valves.

#### C. Operators

1. Valves shall open counterclockwise, unless directed otherwise by the Owner.
2. All valves shall have permanent open direction indicator.
3. Valves which are installed with improper orientation shall be removed and reinstalled at no additional cost to the Owner.
4. Manually operated valves, with or without extension stems, shall require not more than 40-pound pull on manual operators to open or close the valve against specified criteria or process operating conditions.
5. Gear actuators shall meet the requirements of Section 2.3 of this specification. Gear actuators and valve components shall be able to withstand a minimum pull of 200 pounds on manual operator and input torque of 300-foot pounds to actuator nut.
6. Electric operators shall meet the requirements of Section 2.3 of this specification. Valve accessories for handwheels or chainwheels shall meet the requirements of Section 2.4 of this specification.
7. Manual operators shall include handwheel, chainwheel, crank, lever, or T-handle wrench shall meet the requirements as specified in Section 2.4 of this specification.

#### D. Coatings

1. Valve Operators and Accessories Inside Structures.
  - a. Shop priming shall be in conformance with Section 09 90 00, "Painting."
  - b. Factory finishing shall be in conformance with Section 09 90 00, "Painting."
2. Painted Surfaces. Unless noted otherwise, all interior and exterior ferrous surfaces of all valves, operators, and accessories shall be primed and finish painted in the factory in accordance with Section 09 90 00, "Painting."



3. All valve operator and accessory coatings in contact with potable water shall meet NSF Standard 61 and will have to be listed by NSF and/or the Ohio Environmental Protection Agency (EPA).
4. Stainless steel surfaces shall not be painted unless otherwise noted.

## 2.02 VALVE TYPES

### A. Ball Valves

#### 1. Bronze

- a. Manufacturer. Subject to compliance with the specifications, provide the full-port valves from one of the following approved manufacturers.
  - 1) NIBCO (1/4 inch – 3 inches).
  - 2) Apollo (1/4 inch – 2 inches).
  - 3) Watts (1/2 inch – 2 inches).
  - 4) Milwaukee (1/4 inch – 2 inches).
- b. Performance. 600-pound-per-square-inch (psi), non-shock, cold working pressure.
- c. Materials.

Part	Material
Body	Bronze ASTM* B 584 Alloy C84400
Trim	Bronze or 316 stainless steel
Handle	Zinc-plated steel
Stem	Silicon bronze
Ball	Brass with hard chrome plate

- d. Fabrication and Assembly.
  - 1) Conforms to MSS SP-110.
  - 2) Full port.
  - 3) Blow-out proof stem.
2. 2-Way, Stainless Steel Ball Valves, 2-Inch and Smaller
  - a. Body shall be standard ball with circular, full port type constructed of Type 316 Stainless Steel for valves for air, water, and gas service.
  - b. Working pressure: 250 psi minimum, unless noted otherwise.
  - c. Valves shall be a threaded design with both socket and threaded end connectors.
  - d. Actuators: Electric actuators for PVC ball valves shall be 115 VAC with thermally protected, reversing motor in NEMA 4X rated enclosure. Actuator shall have manual override. Actuators shall be mounted in the factory and delivered as unit. Actuators shall be same manufacturer as valve.
  - e. Materials and construction
    - 1) Body, Ball and Stem: 316 SS

- 2) Seats and Seals:
- 3) Ends: Threaded
- f. Manufacturer.
  - 1) Velan
  - 2) Or Approved Equal

B. Butterfly Valves

1. Cast Iron Body, Resilient Seat.

- a. Conform to AWWA C504 except as specified herein. Valves rated for 150 psi working pressure unless noted otherwise in the Valve Schedule or on the drawings.
- b. Body shall be cast iron ASTM A126 or ASTM A48 with planed ends or mechanical joint ends per valve schedule included in later in this section.
- c. Disc shall be ductile iron ASTM A576 with 316 stainless steel seating edge.
- d. Valves shall be designed for AWWA Class IV tight shutoff against a differential pressure of 150 psi.
- e. Shaft shall be ASTM A276 Type 304 stainless steel
- f. Body and stuffing box shall be ASTM A126, Class B cast iron. Shaft seals are self-compensating, and renewable, V-type packing with a minimum of four sealing rings.
- g. Gland assembly shall be cast bronze ASTM B584.
- h. Packing gland shall be housed in a solid-walled one-piece structure or approved equal. Packing shall be EPDM material.
- i. Both ends of the shaft shall be integral with valve body.
- j. Seats bonded or mechanically fastened on the discs are not acceptable.
- k. Resilient seat material shall be Buna-N suitable for potable water or sewage or oil bearing liquids, and Viton or ethylene propylene terpolymer for air.
- l. Handwheel or chainwheel operators shall be gear operated with position indicator. Lever operators shall include locks.
- m. Buried valves shall have totally enclosed gear box with operator nut, valve box to finished grade, and extension stem. The gear housing shall have raised shoulder to fit valve box and exclude soil from entering valve box.
- n. Manufacturers.
  - 1) DeZurik BAW AWWA Butterfly Valves

2.03 OPERATORS

A. Manual

- 1. Shall be enclosed gear or traveling nut type as noted in the Valve Schedule with no external moving parts.
- 2. Operating force shall not exceed 40 pounds.
- 3. Provide chainwheel operators on manually operated valves more than 60 inches (1500 mm) above floor. Extend chains to 36 inches (900 mm) above finished floor elevation.

Where valves are above aisles, provide 1/2-inch stainless steel hook bolt to tie chains to sides to keep chain out of walking area. See Paragraph 2.4. J Chainwheel Operators in these specifications for additional requirements.

## B. Electrical

1. General. The electric operators shall conform to the following specifications. The operator shall be the open or close only type (O/C) or modulating type (MOD) as specified. Modulating type operators shall be designed to hold the valve in the intermediate position between fully open and fully closed without creeping or fluttering.
2. Drive Motor. Drive motor shall be of sufficient size to open or close valve against maximum differential pressure when voltage to the motor terminals is 90 percent of nameplate rating. Drive motor shall be specifically designed for operator service and shall be of totally enclosed, nonventilated construction, with permanently lubricated ball bearings. Drive shall have Class F insulation. The drive motor shall be provided with a thermostatically controlled heater. The power source to the motor shall be 120-volt, 1 phase or as shown on Contract Drawings. Provide thermal switches, embedded in motor windings to protect against overheating. Provide NEMA 4X enclosure.
3. Limit Switches. Limit switches and the limit switch drive mechanism shall be an integral part of operator. Limit switches shall be adjustable, allowing for trip points from fully open to fully closed positions of valve travel. Limit switches shall be geared to, and actuated by, the driving mechanism whether in motor drive or manual (handwheel) operation. Operator shall have provisions for mounting at least eight (four N.O., four N.C.) additional limit switches which shall be housed in an integral housing to the operator. Limit switch compartment to have no exposed electrical connections. Use proximity style limit switches wherever possible. Provide a NEMA Type 4X enclosure.
4. Torque Switches. Each operator shall have an opening torque switch and a closing torque switch. Torque switches shall have a range of adjustment and be responsive to opening or closing loads such that switches operate to protect valve and operator from damage when there is valve obstruction during opening or closing.
5. Handwheel and Declutching Mechanism. Declutching mechanism shall operate valve by means of permanently attached auxiliary handwheel. Declutch assembly and handwheel may be used to operate valve when electrical power is not available. Handwheel shall require no more than 40 pounds of rim pull. Actuation of motor shall automatically return the operator to the electric mode. Handwheel is not to rotate while operator is in the electric mode. Electric mode can be overridden locally by holding declutch lever down and rotating handwheel manually.
6. Motor Controller. A NEMA or IEC rated reversing motor controller with either overload relays in each phase or a thermal relay responsive to motor winding temperature, or both, shall be provided. Each opening and closing contactor shall be equipped with auxiliary contacts and mechanical linkages such that controller shall be electrically and mechanically interlocked. Controller shall be completely wired to 600 volt terminal blocks or plug assemblies in a minimum NEMA 4 or ingress protection (IP) 65 rated housing which is integral to operator. Valve travel time shall be 60 seconds from the fully open to fully closed position. All internal wiring in the housing shall be to terminal strips or plug assembly, and all limit and torque switches shall be wired to these terminals. Include a control transformer with a minimum volt-ampere rating of 2.5 times the volt-ampere load of the motor contactor coil. The

control transformer shall have fuse protection on the primary and secondary side circuits.

7. Open-Close Operators (O/C). The valve control shall be provided with local switches for local/remote and open/stop/close operation. The local switches shall be provided on the limit switch compartment. A mechanical dial for local position indication shall be provided.
8. The local switches shall be provided on the limit switch compartment. A mechanical dial for local position indication shall be provided.
9. Modulating Requirements. Modulating operators shall include a proportional position servo amplifier. The proportional position servo amplifier shall be designed to accept a 4-20 milliamperes direct current (mA<sub>dc</sub>) input signal. The unit shall contain the following control functions.
  - a. Span. This function shall calibrate the position feedback potentiometer to cause the full rotation of the output shaft to correspond to the full 0 to 100 percent range of the signal from the set point controller.
  - b. Zero. This function shall calibrate the position feedback potentiometer to cause the travel of the output shaft to be properly centered.
  - c. Gain. This function shall control the rate at which the motor speed increases as the error signal increases.
  - d. Dead Band. This function shall control the magnitude of error signal that occurs before the motor begins to rotate to prevent hunting.
  - e. The control module shall be furnished with two feedback potentiometers for use in balancing the control circuit and for remote indication. The position feedback potentiometer shall be provided with antibacklash gearing or shall be operated directly from the valve shaft as required to minimize hysteresis to within 1 degree. Modulating type electrically operated valve shall include valve position transmitter. The output signal from the valve position transmitter shall be 4-20 mA<sub>dc</sub>. The valve control shall be provided with selector switches to allow local open/close operation or automatic modulating control from the remote 4-20 mA<sub>dc</sub> signal. The selector switches shall be provided on the limit switch compartment. A mechanical dial for local position indication shall be provided.
10. Local Controls. The valve control shall be provided with local switches for local/remote and open/stop/close operation. The local switches shall be provided on the limit switch compartment. A mechanical dial for local position indication shall be provided. The valve operator shall be provided with an integral ON-Off power switch. Provide illuminated indicating lights to display current status. Provide auxiliary contracts for valve FAULT and LOCAL-OFF-REMOTE switch status.
11. Gear Box Assembly. Gear box is to be completely filled with lubricant, allowing operator to be installed in any position. Operator design shall accommodate removal of motors without loss of lubrication.
12. Base Bid Manufacturer.
  - a. AUMA

## 2.04 ACCESSORIES

### A. Lever Type Operators

1. For valves located less than five feet above operating floor, provide levers on four-inch diameter or smaller, quarter-turn valves, and provide handwheels on all other valves, unless otherwise shown or specified.
  2. Lever operators are only applicable to manual operation of one-quarter valves under 4 inch diameter that satisfy maximum allowable 40 pound pull force needed to unseat and operate valve. Lever shall be capable of being fixed in any intermediate position.
- B. Handwheel Operators
1. Conform to applicable AWWA standards.
  2. Material of Construction: Ductile iron, or cast aluminum.
  3. Arrow indicating direction of opening and word "OPEN" shall be cast on trim of handwheel.
  4. Maximum handwheel diameter: 2.5 feet.
  5. Manual operators shall be enclosed gear or traveling nut type with hand wheel as noted in the Valve Schedule with no external moving parts.
  6. Operators shall be sized for 40 pound pull force.
  7. Provide chain wheel and chain for valves where centerline of valve stem is greater than five (5) feet above floor.

### **PART 3 - EXECUTION**

#### 3.01 EXAMINATION

##### A. Inspection

1. Verify job conditions and intended valve service before ordering each valve.
2. Inspect for damage to valve resulting from shipping and handling prior to installation.
3. Remove debris from inside piping system before installation.

#### 3.02 PREPARATION

##### A. Handling

1. Handle valves and accessories with care.
2. Comply with the manufacturer's instructions.

#### 3.03 INSTALLATION

##### A. Procedures

1. Install in accordance with manufacturer's instructions.
2. Install operators for most convenient access. All valve operator access shall be located only after coordinated with the Owner's operation personnel and the Engineer/Architect.
3. Install plumb and level.
4. Install free from distortion.
5. Install with proper support and restraint.

#### 3.04 FIELD QUALITY CONTROL

##### A. Inspection

1. Verify conformance with manufacturer's shop drawings.

2. Verify conformance with manufacturer's instructions.
3. Report defects in workmanship, materials, and performance.

### 3.05 ADJUSTING

#### A. Procedures

1. Follow manufacturer's instructions.
2. Adjust stops and friction clamps for proper operation.

### 3.06 DEMONSTRATION

#### A. General

1. Demonstrate proper operation under actual service conditions.
2. Valves that have moving internal mechanisms designed to operate without manual operation shall have functions demonstrated for a minimum of three repeat cycles. This includes air release valves, air and vacuum breaker valves, pressure reducing valves, back pressure valves, check valves, pressure relief valves, surge anticipator, and surge relief valves.
3. All valves shall be demonstrated to not leak under maximum design operating pressures when operated for a minimum of three repeat cycles of open and close during the operational demonstration period.

### 3.07 MAINTENANCE

#### A. Contractor's Responsibility

1. Conform to manufacturer's recommended procedures.
2. Provide initial lubrication and maintenance.
3. Perform maintenance until the installation is accepted by the Owner.

## **PART 4 - VALVE SCHEDULE**

### 4.01 GENERAL

- A. The Valve Schedule is for the convenience of the Contractor and the omission of any valve does not release the Contractor from the responsibility to furnish and install all the valves required by the drawings.

### 4.02 SIZES

- A. Only valves 3 inches and larger are included in the Valve Schedule. Valves integral to or specified with other equipment, valves bid as part of unit price items, and valves to be furnished under plumbing, heating, or other sections of the specifications are not included.

#### 4.03 FLOW CONTROL VALVE SCHEDULE

Location	Pipe/ Use	Size (Inches)	Ends	Qty	High Pressure Setting (psi)	Low Pressure Setting (psi)	Flow Setting (gpm)	Valve Function	Actuator Function	Service
Lower Pump Gallery	Flow Control	24"	FLG	1*	150	20	7,000	FC	MOD	CW

\*Owner will provide 24" DeZurik butterfly valve only. Valve is NSF 61 compliant.

Schedule Notes:

Ends: FLG – flanged

Functions: MOD – Modulating; FC – flow control;

Service: CW – clean potable water

**SECTION 40 42 13**  
**PROCESS PIPING INSULATION**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Process Piping. See Section 40 05 13, "Process Piping, General," and Section 40 05 18, "Process Piping, Accessories."
- C. Painting. Painting is specified in Section 09 90 00.
- D. Submittals. See Section 01 33 00, "Submittals."

1.02 DESCRIPTION OF WORK

- A. General. Provide the labor, tools, equipment, and materials necessary to furnish and install the process piping insulation.

1.03 QUALITY ASSURANCE

- A. Codes. Perform all work to furnish and install the process piping insulation in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. Standards
  - 1. ASTM – American Society for Testing and Materials.
  - 2. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE)
  - 3. North American Insulation Manufacturers Association (NAIMA)
  - 4. National Fire Protection Association (NFPA)
  - 5. Underwriter’s Laboratories (UL)
- C. Fire-Test-Response Characteristics:
  - 1. Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes and cement material containers with appropriate markings of applicable testing and inspecting agency.
  - 2. Insulation installed indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
  - 3. Insulation installed outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.



#### 1.04 SUBMITTALS

- A. Approval Drawings. Submit shop drawings and product data for approval. Shop drawings shall be in accordance with Section 01 33 00 and shall include:
  - 1. Manufacturer's name.
  - 2. Product data including insulation and jacketing material, thickness, manufacturer's product number, K-value, and all furnished accessories.
  - 3. Dimensional layouts and locations.
  - 4. Complete description in sufficient detail to permit an item-by-item comparison with the specifications.
  - 5. Manufacturer's instructions.

#### 1.05 JOB CONDITIONS

- A. General. Verify job conditions which may impact insulation layouts and dimensions prior to ordering materials. Install insulation to field measurements unless specifically noted otherwise.
- B. Coordination. Coordinate with all other trades to prevent delays, errors, or omissions.
- C. Climatic Conditions. Do not perform installation when ambient conditions would cause damage to the materials, jacketing, or otherwise violate manufacturer's installation requirements.
- D. Repainting of Existing Piping. All process piping shall be cleaned and painted prior to application of pipe insulation.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General. Deliver, store, and handle the process piping insulation in accordance with Section 01 60 00 and the manufacturer's instructions.
- B. Containers. Insulation, covering, cements, adhesives, and coatings shall be delivered to the site in containers with manufacturer's stamp or label showing fire hazard index of products.
- C. Protection. Protect insulation against dirt, water, and chemical and mechanical damage. Remove wet or damaged insulation from project site.
  - 1. Maintain ambient conditions required by manufacturers of tapes, adhesives, mastics, cements and insulation materials.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

- A. Foam Piping Insulation
  - 1. Foam Insulation. Flexible, unicellular, foamed insulation with sealed end joints. ASTM C 534, Type 1.
  - 2. Insulation shall be coated in accordance with Section 09 90 00, "Painting."

3. The minimum insulation thicknesses shall be the minimum required for condensation control, but in no case less than the following minimum thicknesses with factory-applied vapor barrier and all joints firmly butted, lapped, and sealed with vapor barrier cement:
    - a. 3/4 inch thick for pipes under 1" diameter;
    - b. 1 inch thick for pipes up to 12" diameter,
    - c. 2 inch thick for pipes larger than 12: diameter.
  4. Insulation shall be Johns-Manville Aerotube; Rubatex; Armstrong Armaflex; or equal.
- B. Fiberglass Piping Insulation
1. Fiberglass insulation shall be in accordance with ASTM C 547, Class 1 for use up to 450 degrees Fahrenheit (° F.).
  2. The minimum insulation thicknesses shall be the minimum required for condensation control, but in no case less than the following minimum thicknesses with factory-applied vapor barrier and all joints firmly butted, lapped, and sealed with vapor barrier cement:
    - a. 3/4 inch thick for pipes under 1" diameter;
    - b. 1 inch thick for pipes up to 12" diameter,
    - c. 2 inch thick for pipes larger than 12: diameter.
  3. Exterior insulation shall be 3 inches thick with aluminum jacketing. Jacketing shall meet ASTM C 921, Type I (vapor barrier) including all the typical requirements in Table 1 in that standard. The aluminum shall meet ASTM B 209.
  4. Insulation shall be Johns-Manville Micro-Lok, Owens Corning, or equal.
- C. Equipment Insulation
1. Flexible Fiberglass Equipment Insulation. ASTM C 553, Type I, Class B-6 (3 pounds per cubic foot density). Insulation shall be Manville Products Corp., Owens-Corning Fiberglas Corp., or equal.
- D. Field Applied Jackets
1. PVC: Indoor/Outdoor, UV-resistant fittings, jacketing and accessories, white or colored. Fitting cover system consists of pre-molded, high-impact PVC materials with fiber glass inserts. Closures: stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.
  2. Metal: Aluminum, 0.016" (0.406 mm) thick or Stainless Steel, 0.010" (0.254 mm) thick in smooth, corrugated, or embossed finish with factory-applied moisture barrier. Overlap shall be 2" (50 mm) minimum. Fittings shall be die-shaped with factory-applied moisture barrier.
  3. Laminated Self-Adhesive Water and Weather Seals: permanent acrylic self-adhesive system; weather resistant, high puncture and tear resistance; meeting or exceeding requirements of UL 723; applied in strict accordance with manufacturers' recommendations.
- E. Accessories
1. Insulation installed outside shall be coated or jacketed as recommended by the manufacturer for a weatherproof installation.

2. Staples, Bands, Wires, and Cement. As recommended by insulation manufacturer for applications indicated.
3. Adhesives, Sealers, and Protective Finishes. As recommended by insulation manufacturer for applications indicated.

### **PART 3 - EXECUTION**

#### **3.01 INSPECTION**

- A. Existing Conditions. Examine areas and conditions under which insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Insulation. Inspect insulation for dirt, water, or damage. Do not install wet or damaged insulation.

#### **3.02 INSTALLATION**

- A. Insulation Omitted. Omit insulation on unions, check valves, balance cocks, and flow regulators.
- B. General Piping. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
  1. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
  2. Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.
  3. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
  4. Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
  5. Cover valves, fittings, and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut, or job fabricated units (at installer's option) except where specific form or type is indicated.
  6. Extend piping insulation without interruption through walls, floors, and similar piping penetrations, except where otherwise indicated.
  7. Hangers. Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3 inches wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inches wide vapor barrier tape or band.
  8. Copper Pipe. Insulation used in below grade and outdoor installations shall be free from nitrites and not contain more than 0.2 percent ammonia.
  9. Outdoor Insulation. Protect outdoor insulation from weather by installing outdoor protective finish or jacketing as recommended by the manufacturer.

- C. Insulation Joints. Install insulation with all end joints with an adhesive as recommended by the manufacturer. Apply insulation without longitudinal joints by slipping the insulation over the lengths of pipe before connections are made. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
- D. Equipment Insulation
  - 1. General. Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
  - 2. Surfaces. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
  - 3. Vapor Barrier. Maintain integrity of vapor barrier on equipment insulation and protect it to prevent puncture and other damage.
  - 4. Temperature. Do not apply insulation to equipment, breechings, or stacks while hot.
  - 5. Joints. Apply insulation using the staggered joint method for both single and double layer construction, where feasible. Apply each layer of insulation separately.
  - 6. Cement. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.
  - 7. Jacket. Cover insulated surfaces with all service jacketing neatly fitted and firmly secured. Lap seams at least 2 inches. Apply over vapor barrier where applicable.
  - 8. Removable Insulation. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.
  - 9. Equipment Exposed to Weather. Protect outdoor insulation from weather by installation of weather barrier mastic protective finish, or jacketing, as recommended by the manufacturer.

### 3.03 EXISTING INSULATION

- A. Protection. Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period to avoid damage and deterioration.
- B. Repair. Repair damaged sections of existing insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation; install new jacket lapping and seal over existing.
- C. Replacement. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

### 3.04 INSULATED PIPING LIST

- A. General. The following interior exposed process piping of the size shown on the plans shall be insulated.

Type	Pipe Name	Insulation Type	Exterior/Interior
Finished Water	Existing 24" Steel Pipe	Foam, 2"	Interior with PVC Jacket

END OF SECTION

**SECTION 40 90 00**  
**INSTRUMENTATION SYSTEMS BASIC REQUIREMENTS**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. Related Sections. The following sections contain requirements that relate to this section:
  - 1. Section 22 05 53, "Plumbing Identification."
  - 2. Section 26 00 01, "Basic Electrical Requirements."
  - 3. Section 26 00 02, "Basic Electrical Materials and Methods."
  - 4. Section 26 05 33, "Raceways."
  - 5. Section 26 05 12, "Wires, Cables, and Connectors."
  - 6. Section 26 05 23, "Communication and Signal Cables."
  - 7. Section 26 05 34, "Cabinets, Boxes and Fittings."
  - 8. Section 26 27 26, "Wiring Devices."
  - 9. Section 26 05 29, "Supporting Devices."
  - 10. Section 26 05 53, "Electrical Identification."
  - 11. Section 26 05 26, "Grounding."
  - 12. Section 40 93 13, "Control Devices."

1.02 DESCRIPTION OF WORK

- A. Scope of Work. The Electrical Contractor shall provide the labor, tools, equipment, and materials necessary to implement general administrative and procedural requirements for instrumentation installations in accordance with the plans and as specified. The following administrative and procedural requirements are included in this section to expand the requirements specified in Division 1:
  - 1. Quality assurance.
  - 2. Submittals.
  - 3. Job conditions.
  - 4. Delivery, storage, and handling.
  - 5. Special warranty.
  - 6. Definitions.
- B. Work under this contract consists of furnishing, installing, testing, and guarantee of the complete instrumentation system as shown on the drawings and as specified herein. The Contractor shall connect and place all equipment in proper working order. The following is a general summary of work comprising the instrumentation system and is hereby included:
  - 1. Instrumentation equipment specified in Division 40.

2. Branch circuit conduit and wiring to all instrumentation equipment. 120 volt 1 phase circuit breakers are provided for instrument use at designated panelboards as work of Division 26. Work of this section begins with branch circuit connection to these circuit breakers and includes branch circuit wire and conduit.
3. Signal wiring between all instrumentation equipment.
4. Interlock wiring between instrumentation equipment and equipment furnished under other divisions of the specifications. Interlocks shall include alarm contacts, control contacts, and 4-20 ma analog signals. Such interlocks are required by diagrams, schematics, notes, or narrative descriptions. Extend these interlocks to and land them on terminal strips provided in equipment, motor starters, motor control centers, etc.
5. Raceway system interior to structures and exterior within 5 feet of structures for instrumentation wiring. Raceway only shall be provided between buildings as part of Division 26 work. See Electrical Plans for extent of such raceway. Any additional exterior raceway required shall be part of work of this section.
6. The Contractor shall hire an instrumentation and control (I&C) system integrator to participate in performing the I&C work.
7. The responsibilities of the I&C system integrator shall include:
  - a. Prepare instrument loop drawings.
  - b. Provide and calibrate instruments and controls.
  - c. Prepare schematics and layout drawings, and fabricate accordingly.
  - d. Configuration and programming.
8. The integrator shall provide operating instruction manuals with adequate information pertaining to the following:
  - a. System specifications.
  - b. Electrical power requirements.
  - c. Application considerations.
  - d. Assembly and installation procedures.
  - e. Power up procedure.
  - f. Troubleshooting procedure.
  - g. Programming procedure.
  - h. Explanation of internal fault diagnostics.
  - i. Shutdown procedures.
  - j. Recommended spare parts list.

C. System Tests

1. The Contractor shall prepare and submit to the Engineer for review, a detailed description of the test procedures that he proposes to perform to demonstrate performance of the complete system.
2. The Contractor shall provide Instrument Calibration Sheets and a space for sign-off on individual items and list by the Contractor. A sample of an Instrument Calibration Sheet form shall be submitted for approval by the Engineer.

3. Test Plans. Specific test plans shall be written to cover all phases of factory and field testing and shall include, but may not be limited to, the following:
  - a. Describe the purpose of the tests, the test equipment required, and the step-by-step method of implementation necessary to accomplish the specified test as well as define the necessary test prerequisites.
  - b. Comprise drawings and figures that show the test equipment arrangement and the interconnection of test equipment to the portion of the equipment system under test.
  - c. Include associated test data sheets which must be completed with the test data as each test progresses. The test program shall require satisfactory completion of the tests in sequence which shall demonstrate that the design hardware and software procured and installed are effective and safe. As each phase of testing is complete, the test data sheets shall be signed and dated.

### 1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work in accordance with the applicable requirements of governing agencies having jurisdiction and in accordance with the plans and as specified herein. Comply with applicable provisions and recommendations of the following:
  1. Instrument Society of America (ISA).
  2. National Electrical Code (NEC).
  3. National Electrical Manufacturers Association (NEMA).
  4. Institute of Electrical and Electronic Engineers (IEEE).
  5. American National Standards Institute (ANSI).
  6. National Fire Protection Association (NFPA).
  7. Scientific Apparatus Manufacturers Association (SAMA).
  8. Underwriters' Laboratories (UL).
  9. Joint Industrial Council (JIC).
  10. Factory Mutual (FM).
  11. International Standards Organization (ISO).
  12. American Society for Testing and Materials (ASTM).
  13. International Electrotechnical Commission (IEC).
  14. Electronic Industries Association (EIA).
- B. Qualifications
  1. Manufacturer's Qualifications.
    - a. A financially sound firm with at least 5 years of experience in design, manufacture, supply, service, and support of instrumentation and control equipment specified for this project.
    - b. A record of prompt shipments in accordance with contract obligations.
    - c. A documented quality assurance program complying with industry and agency standards.



- d. A documented product safety policy relevant to the products being manufactured for this project.
  2. Installer's Qualifications. An approved manufacturer's representative factory educated in maintenance, installation, and start-up of the instrumentation and control equipment to be supplied.
- C. System Responsibility. The instrumentation and control system shall be furnished by one integrator who shall be responsible for the development of submittals, acceptance tests, start-up and support, and all warranty work for the entire system. Responsibility cannot be split among individual suppliers. The system integrator's responsibility shall include but not limited to:
1. Provide, calibrate, establish data communication and basic field operational start-up of all field instruments.
  2. Provide, assemble, install and start-up process controllers and all related equipment.
  3. Provide, assemble, install and test PLCs, HMI and communication equipment provided by the system integrator.
  4. Furnish communication cabling system including Fiber optic, Ethernet and Profibus cables. Perform all field terminations and field testing as required.
  5. Provide, perform all necessary hardware, software, programming to interface the PLCs with the other vendor supplied PLCs, devices, equipment and the existing City wide SCADA system over Ethernet, Profibus and hardwired medium as shown on the drawings.
  6. Provide, perform all necessary hardware, software, programming to interface the new field instruments, panels, devices.
  7. Provide calibration documentation on all calibrated equipment.
  8. Provide operational and maintenance manual documentation including I/O allocation, wire and terminal numbers and system components.
  9. Development of system and equipment shop drawings, record drawings and O&M manuals for all equipment and systems provided by the system integrator.
  10. Operator training as specified herein.
  11. Refer to section 40 95 33 for additional system requirements.

#### 1.04 SUBMITTALS

- A. Sequencing and Scheduling. Follow the procedures specified in Division 1 section "Submittals," and in addition, the Contractor shall prepare and submit a complete submittal list to the Engineer/Architect. The submittal list shall include all submittal items covered in the Division 40 specification sections. In addition, the submittal list shall contain dates for all items to be submitted and shall accompany the first submittal. Submittal list date changes shall be updated on a monthly basis. The submittal list shall be coordinated with the construction schedule and shall clearly show such coordination. Include expected dates for gaining approval for each Division 40 specification section. The submittal list shall include the expected factory test, equipment shipping, installation, and operational test dates for each Division 40 specification section.
- B. System Responsibility. Submit a letter from the responsible integrator stating acceptance of system responsibility.

- C. Shop Drawings. Submit shop drawings to substantiate that the materials and equipment comply with the specification requirements. All drawings, data sheets, lists, forms, etc., shall clearly state the job name, Owner, location, and date. Submit the following types of drawings in accordance with Section 01 33 00.
1. Materials List. Submit a list of materials giving quantities, manufacturer's name, and catalog numbers listed by equipment tag numbers. All equipment shall have a tag number. The list shall identify sheet numbers where each tag numbered item can be found.
  2. Product Data. Submit manufacturers' technical product data sheets for items listed in the instrument schedule and for any additional components required for a complete functional system. Delete or "x" out inappropriate or inapplicable information on each page of product data submittals.
  3. Specification Form. A completed specification form similar to ISA Standard S20 shall be included for each instrument. The specification form shall include an instrument tag number as per ISA Standard S5.1 Section 3.1.
  4. Dimensional Drawings. Submit dimensional drawings for instrument mounting, process connection details, instrument cabinets, panels, and each piece of equipment.
  5. Wiring Diagrams. Submit the following:
    - a. Field wiring diagrams for wiring into and out of control panels, identifying terminal numbers of the field equipment or other remote termination points.
    - b. Master interconnection wiring and piping drawing showing all field and panel mounted equipment and terminal identifications. Each individual manufacturer's system drawings shall be furnished.
    - c. Internal wiring drawings for each control panel identifying each and every component, numbered wire, numbered terminal, and terminal block. Loop diagrams shall follow ISA-S5.4 format.
- D. Operation and Maintenance Manuals. Submit four bound and indexed operation and maintenance (O&M) manuals prior to delivery of the equipment. Each option and accessory shall be clearly and accurately shown. The O&M manuals shall include:
1. Installation instructions and details.
  2. Start-up instructions.
  3. O&M instructions.
  4. Detailed parts list with name, address, and telephone number of supply source.
  5. Troubleshooting guide.
  6. Electrical and mechanical diagrams.
- E. Spare Parts List. Submit a list of spare parts required to be supplied by the Contractor.
1. List. Include a current parts list indicating part name, equipment, name, stored quantity, manufacturer/source address, telephone number, and salespersons name within the secured storage area.
- F. Samples
1. Nameplate size selection and lettering style.
  2. Samples of factory colors for prefinished housings and enclosures.

- G. Software Documentation. Submit four annotated copies of all software required to be furnished as part of these specifications and four copies of a written description of the software. Software includes configuration. Submit annotated logic diagrams and graphics formatted as a Microsoft Word document and stored on CDs. If annotated logic diagrams and graphics cannot be formatted as a Microsoft document, provide the required software for use by the consultant for review purposes.
- H. Test Procedures. Submit to the Engineer/Architect for review, a detailed description of field test procedures proposed to demonstrate performance of the complete system. Whenever possible "live" inputs and functional outputs shall be used. Whenever this is not possible, the Contractor shall simulate inputs and loads.
- I. Contract Closeout Submittals
  - 1. Project Record Documents. The Contractor shall have two working sets of prints of the Contract Drawings and submittals. The Contractor shall furnish an identical bound set, with index tabs, to the Owner's Representative when field wiring is to begin. All changes made during the course of the work shall be made by the Contractor to the field set and transferred to the office set of prints on a weekly basis. Dated copies clearly showing "As Built" or "As Constructed" information shall be sent weekly for each affected sheet to the Owner's Representative. Both sets shall be available for comparison by the Owner's Representative and Owner during the course of the work. After project completion both sets of documents shall be delivered to the Owner.
  - 2. O&M Manuals. Replace all affected drawings supplied in the O&M manuals with "As Built" revised drawings.
  - 3. O&M Manuals. See section 01 33 00, "Submittals" for additional O&M manual requirements.
  - 4. Record Drawings. The Contractor shall furnish detailed wiring drawings for all instruments and controls. Drawings shall show all tag numbers, point-to-point wiring, and terminal numbers used on the external wires. In addition, any changes made by the Contractor to internal wiring of equipment or components inside enclosures furnished by the Contractor shall have "As Constructed" revisions to the original manufacturer's drawings detailing these additions or revisions. The record drawings shall include all wire numbers and terminals used plus a list of all settings for each instrument. Replace all affected drawings supplied in the O&M manuals with record drawings.
  - 5. Maintenance Service. Offer a yearly maintenance agreement to the Owner listing the terms and conditions of this maintenance service along with a price for the second year of operation.

#### 1.05 JOB CONDITIONS

- A. Protection. Manufacturer's requirements for protecting equipment from heat, cold, moisture, dust, and rough handling shall be strictly adhered to.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping. Deliver equipment properly packaged and mounted on pallets or skids to facilitate handling of heavy items. Utilize factory fabricated type containers or wrappings for components which protect equipment from damage.
- B. Acceptance at Site. Inspect equipment to ensure that no damage has occurred during shipment. Handle equipment carefully to prevent physical damage to equipment and components. Remove packaging, including the opening of crates and containers, avoiding

the use of excessive hammering and jarring which would damage the electrical equipment contained therein. Do not install damaged equipment; remove from site and replace damaged equipment with new. Inspect all equipment at time of delivery as to model, quantity, and physical condition. All equipment shall be identified by name and tag number. Site conditions must be clean, dry, heated, and dust free before equipment is removed from packaging or installed.

- C. Storage and Protection. The Contractor shall store the items furnished under this section until they can be installed. Such storage shall meet the requirements of the system supplier and be approved by the Owner. Use all means necessary to protect the material of this section before, during, and after installation, and to protect the installed work and materials of all other trades. Provide factory applied end caps to protect all threads on pipes and valves.

#### 1.07 SPECIAL WARRANTY

- A. General. The Contractor shall retain the services of factory trained servicemen to provide repair services for the instrumentation and control system for 1 year, commencing with the time the system equipment is complete and accepted by the Owner, and including all repair and replacement parts needed during the warranty period.

#### 1.08 DEFINITIONS

- A. Manufacturer. The designer and fabricator of an instrumentation or control product.
- B. System Integrator. The designer, assembler, and supplier of the complete instrumentation and control system. The system integrator has responsibility to the Contractor and Owner for a complete functional instrumentation and control system.
- C. Interior. For the purposes of this specification, interior is any area within the boundaries of the foundation, walls, and roof of any building or other structure.
- D. Wet Locations. Exterior areas, interior areas below grade, and interior areas above grade in which wet materials are processed, pumped, transported, or stored are designated as wet locations. Equipment installed in these areas must bear a manufacturer's certification of suitability for such environments.

#### 1.09 MAINTENANCE (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 GENERAL

- A. All equipment installed in wet locations shall be rated NEMA 4X.

#### 2.02 MATERIALS

- A. General. All materials shall be in accordance with the drawings and specifications. The following miscellaneous materials shall be furnished by the Contractor:
  - 1. Mounting hardware as specified in Division 26 section "Supporting Devices."
  - 2. Wire labels as specified in Division 26 section "Identification."
  - 3. Nameplates as specified in Division 26 section "Identification."
  - 4. Relays, timers, and pilot control devices as specified in Division 40 section "Control Devices."

B. Terminal Blocks

1. General. IEC style, corrosion resistant blocks, rail mounted rated for 300 volts minimum.
2. Terminals. Screw type, stainless steel wire clamp, nickel plated copper conductor bar, wire range of No. 20 to No. 10 AWG.
3. Accessories
  - a. Din rail.
  - b. End barriers and end anchors.
  - c. Knife disconnect isolating switches.
  - d. Fuse blocks with fuse puller for each.
4. Manufacturers. Subject to compliance with the requirements of this specification, available manufacturers of terminal blocks include, but are not limited to, the following:
  - a. Phoenix Contact
  - b. Buchanan.

C. Power Supplies

1. Regulated direct current (dc) power supplies for instrument loops shall be designed and arranged so that loss of one supply does not affect more than one instrument loop.
2. Provide MOV type surge protectors on input and output. Each shall have visible indication of input and output, out of service.
3. Power supplies shall be suitable for 120 volt input with a variation of  $\pm 10$  percent, and the supply output shall be fused or short circuit protected.
4. Output voltage regulation shall be as required by the instrumentation equipment being supplied with a minimum of 0.1 percent.
5. Size and output voltage shall be as shown on the drawings or schedules.
6. Manufacturers. Subject to compliance with the requirements of this specification, available manufacturers of power supplies include, but are not limited to, the following:
  - a. Acopian Corporation.
  - b. Moore Industries.
  - c. Condor DC Power Supplies, Inc.

- D. Gauges and Snubbers. Provide gauges and snubbers as specified in Division 22 section "Meters and Gauges."

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Existing Conditions. Examine the site and existing facilities. Compare the site and existing facilities with the drawings and specifications. With respect to the conditions of the premises, locate connections of existing facilities and any obstructions which may be encountered and conduct work to minimize disruption to existing conditions.
- B. Field Measurements. Field verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and regulations, the contract documents, and the referenced standards.

### **3.02 GENERAL INSTALLATION**

#### **A. General**

- 1. Location of instruments shown on the drawings are approximate unless specifically dimensioned. The Contractor shall install the instruments to perform their intended function in full coordination with existing conditions and the work of other trades.
- 2. The Contractor shall furnish, fabricate, and mount all instrument stands and brackets. Mounting of stands and instruments shall be per installation detail drawings. All stands must be level, plumb, rigid, and free from vibration. Additional support shall be added where required for vibration free mounting.

#### **B. Instrumentation wiring is shown schematically on the plan or described by narrative in the specifications. Contractor to provide type and quantity of wiring necessary to perform the function specified in Division 40 and shown on the plans. See Division 26 wire and cable sections for "uses permitted." Analog signal conductors and discrete signal conductors shall always be in separate conduits or cable tray compartments. Power wiring shall be in conduits and cable tray compartments separate from all signal wiring. Power wiring wherever required by instruments or equipment provided as part of the instrument system is work of this section.**

- 1. The Contractor shall terminate field wiring for equipment specified under this section. The system integrator shall check instrument installation and field wiring before instrument devices are electrically powered by Contractor. Wires shall be terminated at terminal blocks with crimp type, preinsulated tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated. All signal shields shall have only one ground point which shall be located at the closest control panel. Seal around all conductors inside conduits as they enter equipment. Use watertight seal (closed cell RTU foam type) entering or leaving every building, box, or instrument. Install conduit water relief or "weep" on the system side of all seals to prevent intrusion of water into the equipment.
- 2. Spare Wiring. Signal and interlock wiring shall contain spare conductors in every raceway. Spare conductors shall be provided in pairs and shall be clearly and distinctly marked at every access point indicated where the pairs start and stop. The minimum number of spare pairs shall be 25 percent of the number of active pairs with a minimum of one spare pair.

#### **C. Threaded Connections**

- 1. Procedure.
  - a. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

- b. Align threads at point of assembly.
- c. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
- d. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

D. Tagging

- 1. All instrumentation equipment shall be provided with identification tags in accordance with the Process and Instrumentation Diagrams, Instrument Symbol sheets, and Section 26 05 53, "Electrical Identification." Each field instrument shall have a stainless steel tag. Identification tags shall be provided by L.E.E. Engraving services, Oakdale, Pennsylvania, or equal.
- 2. The device tags shall be mounted using stainless steel screws.

3.03 FIELD QUALITY CONTROL

A. Piping Tests. After piping systems have been put into service, inspect for leaks. Adjust pipes, valves, or fittings to stop leaks; replace equipment if leak persists.

B. System Tests

- 1. A technical representative of the system integrator and the Contractor shall participate in the checkout of instruments and control systems. If interrelated devices furnished by other suppliers, such as valve actuators, motor controls, chemical feeders, and primary measuring devices do not perform properly when placed in service, the Contractor shall correct the problem. If such correction cannot be made in a timely manner and the Owner agrees, a temporary test condition may be created. The technical representative may use suitable test equipment to introduce simulated signals from those devices; however, he shall be required to locate the source of any trouble or malfunction.
- 2. All special testing materials and equipment shall be provided by the Contractor. Where it is not practical to test with real process variables, the Contractor shall provide suitable means of input and output signals and control strategy simulation. The simulation techniques shall be subject to the approval of the Owner's Representative. Special tests shall meet the requirements of Division 1 Quality Control Services section.
- 3. Test Plans. Field testing shall be performed before the required demonstration. Specific test plans shall be written to cover all phases of field testing and shall include, but may not be limited to, the following:
  - a. Describe the purpose of the tests, the test equipment required, and the step-by-step method of implementation necessary to accomplish the specified test as well as define the necessary test prerequisites.
  - b. Provide drawings and figures that show the test equipment arrangement and the interconnection of test equipment to the portion of the equipment system under test.
  - c. Include associated test data sheets which must be completed with the test data as each test progresses.
  - d. The test program shall require satisfactory completion of the tests in sequence which shall demonstrate that the design hardware and software procured and

installed are effective and safe. As each phase of testing is completed, the test data sheets shall be signed and dated.

- e. Submit the documented adjustments including modifications to the control and alarm settings, process engineering unit changes, limit switch settings, temperature switch settings, pressure switch settings, and torque switch settings.
- f. Submit results of system test in a test data report.

C. The device tags shall be mounted using stainless steel screws.

### 3.04 ADJUSTING

- A. Set Points. Alarm and control set points shall be adjusted to their operational values during the demonstration period.
- B. Calibration. Calibration adjustments shall be performed during the demonstration period for an operational system. Testing shall commence after calibration verification for each instrument is provided to the Engineer.

### 3.05 CLEANING

- A. Instrumentation System. The instrumentation system components shall be kept clean and free of dust during the storage, start-up, demonstration, and warranty period.
- B. Control Panels and Consoles. Clean dust and dirt accumulation inside and outside control panels and consoles, on a monthly basis, during start-up and demonstration period.

### 3.06 DEMONSTRATION

- A. General. When all required tests have been performed and prior to final approval, a qualified representative of the system integrator shall thoroughly demonstrate to the Owner's personnel the operation of the complete instrumentation and control system. Submit report data per Section 01 33 00.
- B. Operational Demonstration. After the system tests have been performed and the Owner's Representative has reviewed the system test report data, the operational demonstration period may begin.
  - 1. The Contractor shall perform an operational demonstration of the instrumentation and control system. Unless otherwise specified, the instrumentation and control system operational demonstration shall be a continuous 3 day (72 hour) period during which the work is operated and maintained in a continuously on-line, fully functional process state.
  - 2. During the operational demonstration period, the following process conditions shall be performed.
    - a. Throttle valves and/or adjust pump speeds to demonstrate the minimum, maximum, and normal flow, level, and pressure conditions of each flow, level, and pressure meter specified in Sections 40 91 03.04 and 40 91 02.02.
    - b. Demonstrate pressure switch and differential pressure transmitter operations specified in Section 40 91 01. Differential pressure transmitters with square root extractors shall be demonstrated with minimum, maximum, and normal flow conditions.
    - c. Demonstrate the operation of analytical instruments specified in Section 40 91 00. If the analytical instrument is used in a chemical feed loop, coordinate with the relevant Sections for proper operation of chemical feed equipment. Create



unusual conditions to test for proper system and equipment connection. During the demonstration period, simulate specified alarm conditions.

- d. All components in the instrument panels and consoles shall function properly during the demonstration period.

### 3.07 PROTECTION

- A. The Contractor shall protect the instrumentation system components from water, dust, dirt, and corrosion during the start-up, demonstration, and warranty period.

### 3.08 INSTRUCTION OF OPERATING PERSONNEL

- A. Field Training. Training shall be conducted in accordance with Section 01 79 02 and shall include equipment specified in this section, related electrical and interfaces to equipment provided by other division sections. Training sessions shall be conducted as follows:
  1. Provide four (4) control system training sessions, each for one (1) six-hour day for five (5) staff members.
  2. The training program shall provide the plant treatment personnel with the capability of operating, maintaining, modifying, and upgrading the software of the process control system supplied.
  3. Provide two post control system training sessions, each for two (2) four-hour days for five (5) staff members. This training shall be scheduled by the owner during the first 6 months after the system has been online.
  4. Training courses shall include hardware components for emphasizing operation, maintenance, interface with other systems, and associated theory. Software training shall include the fundamental software organization, operation of the delivered system, program development, and usage of programming language.
  5. Minimum Goals. Training shall incorporate operational requirements described in these specifications. Training shall provide the treatment plant personnel with the following:
    - a. Process control system start-up and shutdown.
    - b. Routine diagnostic checks and maintenance.
    - c. Control set point and dead band modifications.
    - d. PID controller configuration.
    - e. Selection and interpretation of computer screen displays, printed logs, and reports.
    - f. Computer screen display additions, deletions, and modifications.
    - g. Printed log and report additions, deletions, and modifications.
    - h. Data base additions, deletions, and modifications.
    - i. Response to alarm displays and error indications.
    - j. Program software loading and backup of application.
    - k. Window make/winder viewer.
    - l. How to create new windows.
    - m. How to create new objects.

- n. Demonstrate application manager.
  - o. Demonstrate toolbars and menu functions.
  - p. Demonstrate animation links.
  - q. Tag name dictionary and how to create tag names.
  - r. Real-time trending screen. Demonstrate a creation of a real-time trend.
  - s. Historical trending screen.
  - t. Alarm configuration. Demonstrate alarm configuration (set point, deadband, time delay, enable/disable, etc.)
  - u. Alarm query configuration.
  - v. Demonstrate how to setup the alarm paging software.
  - w. XL reporter/OPS demonstration.
  - x. Plant maintenance logs
  - y. Demonstrate how to setup security passwords at different levels.
  - z. Primary (maintenance) and backup (host) computer security.
  - aa. Demonstrate the automatic redundancy between the computers. Demonstrate how updating the SCADA host PC is done when new configuration has been made into the primary computer (development key).
  - bb. Operation and handling of data storage devices.
  - cc. Hard drive operation and maintenance.
  - dd. Equipment diagnostic testing and replacement of failed parts.
6. The process control system integrator shall submit a training program which provides the treatment plant personnel a theoretical background and a broad range of related skills to achieve the listed goals. The instructor(s) shall be experienced in system applications similar to the equipment specified herein.

### 3.09 SCHEDULES

- A. General. Detailed information to augment specification data may be provided in the form of schedules or in lieu of schedules on ISA S20 specification forms. See each specification section for schedule or ISA specification forms.
- B. Power Supplies Schedule
  - 1. Application. Power supplies shall be provided to enable all equipment provided with and as a part of the Instrument System. If scheduled, such power supplies are understood to be specifically required, but not necessarily a comprehensive list of all power supplies to be provided.
- C. Gauges
  - 1. Application.

END OF SECTION

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**SECTION 40 91 01**  
**PRESSURE MEASUREMENT**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section
- B. Related Sections. Refer to Section 40 90 00, "Instrumentation Systems Basic Requirements," for additional requirements related to this section.

1.02 DESCRIPTION OF WORK

- A. General. The Contractor shall provide the labor, tools, equipment, and materials necessary to install pressure measurement equipment in accordance with the contract drawings and as specified herein.
- B. Types. The types of equipment specified in this section include the following:
  - 1. Pressure transmitter

1.03 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work associated with pressure measurement equipment in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
  - 1. National Electrical Manufacturers Association (NEMA) Compliance.
  - 2. National Electrical Code (NEC) Compliance.
  - 3. Underwriters' Laboratories, Inc. (UL) Compliance and Labeling. Comply with provisions of UL safety standards pertaining to pressure measurement equipment. Provide products and components which have been UL listed and labeled.
  - 4. See Section 40 90 00, "Instrumentation System Basic Requirements," for additional applicable codes and standards.
- B. Qualifications
  - 1. Manufacturer's Qualifications. Firms regularly engaged in manufacture of pressure measurement equipment whose products have been in satisfactory use in similar service for not less than 7 years.
  - 2. Installer's Qualifications. Qualified with at least 7 years of successful installation experience on projects with pressure measurement equipment similar to that required for this project. An approved manufacturer's representative factory educated in maintenance, installation, and start-up of the pressure measurement equipment.

1.04 SUBMITTALS

- A. General. Furnish manufacturer's product data, test reports, and material certifications as required. See Section 40 90 00, "Instrumentation Systems Basic Requirements," for additional submittal requirements, all of which apply.
- B. Materials List. Submit a list of materials giving quantities, manufacturer's name, and catalog numbers.

- C. Wiring Diagrams. Submit wiring diagrams showing all connections for all equipment furnished under this section.

#### 1.05 JOB CONDITIONS

- A. Refer to Section 40 90 00, "Instrumentation Systems Basic Requirements."

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping. Deliver equipment properly packaged and mounted on pallets or skids to facilitate handling of heavy items. Utilize factory fabricated type containers or wrappings for components which protect equipment from damage.

#### 1.07 SPECIAL WARRANTY

- A. Refer to Section 40 90 00, "Instrumentation Systems Basic Requirements."

### **PART 2 - - PRODUCTS**

#### 2.01 MANUFACTURED UNITS

- A. Pressure Transmitter

##### 1. Features.

- a. Sensing element protected by a sealing diaphragm with silicone oil fill solution.
- b. Microprocessor based transmitter.
- c. Integral span and zero adjustments.
- d. Electrically erasable programmable read only memory module and programmable transmitter configuration for flow applications.
- e. Internal dampening
- f. Two wire operation.
- g. Square root or linear output, software selectable.
- h. NEMA 4 enclosure.
- i. Two ½ inch NPT pressure connections.
- j. Analog to digital and digital to analog converters.
- k. Remote and local testing and configuration via digital signal superimposed on the 4-20 mAdc signal.

##### 2. Accessories.

- a. Include stainless steel block and bleed valve, tubing, and fittings.
- b. Manual air release with threaded fitting for attachment of portable calibration unit.
- c. Local indicated reading in engineering units.
- d. Stainless steel tag.
- e. Flanged mounted hardware.

##### 3. Materials.

- a. Sensor. Type 316 stainless steel with Viton O-rings.
- b. Mounting Hardware. Stainless Steel.

- c. Base and Cover. Die cast low copper aluminum with epoxy based finish and Buna O-rings.
- 4. Sizes and Ratings.
  - a. Overpressure Protection. 2,320 pounds per square inch gauge (psig) minimum.
  - b. Accuracy.  $\pm 0.2$  percent of span.
  - c. Ambient Temperature. -20 to 180 degrees Fahrenheit ( $^{\circ}$  F.).
  - d. Pressure Input Range. As specified in the schedule at the end of this section.
  - e. Signal Output. 4-20 milliampere direct current (mA<sub>dc</sub>).
  - f. Ranges as specified in the schedule at the end of this section.
- 5. Manufacturer.
  - a. Subject to compliance with the requirements of this specification, available manufacturers of level transmitters include, but are not limited to, the following:
    - 1) Foxboro
    - 2) Siemens
    - 3) E&H

### **PART 3 - - EXECUTION**

#### **3.01 EXAMINATION**

- A. Verification of Conditions. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- B. Discrepancies. In the event any discrepancies are discovered, immediately notify the Owner's Representative in writing. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

#### **3.02 PREPARATION**

- A. Protection
  - 1. All equipment and materials shall be packed at the factory to protect each item from damage during shipment and storage.
  - 2. Provide blocking and cushioning materials to prevent damage during shipment.
  - 3. Provide temporary lifting lugs on shipping package as needed.
  - 4. Include approximately 1 pint of touch-up paint for each finish color in shipment.
- B. Surface Preparation. The work shall be carefully laid out in advance. Where cutting, drilling, etc., of floors, walls, ceilings, or other surfaces is necessary, this work shall be carefully done. Any damage to building, piping, or equipment shall be repaired by skilled mechanics of the trades involved, and at no additional cost to the Owner.

#### **3.03 INSTALLATION**

- A. General. Coordinate the installation of in-line process pressure elements with the process piping elements.
  - 1. Pressure Transmitter.

- a. Install three valve manifold, ½ inch copper tubing with fittings and air release for attachment of portable calibration unit.
- b. Mount transmitters on wall bracket mounting.
- c. Install transmitter in an orientation where the sensing diaphragms are in a vertical plane and the exposure to shock, heat, and vibration is at a minimum.

3.04 FIELD QUALITY CONTROL

- A. Inspection. Upon completion of this portion of the work, the Contractor shall provide for services of a qualified representative of the manufacturer to inspect and approve installation.
- B. Calibration
  - 1. Verify calibration on field-calibrated devices using calibrated test equipment.
- C. Tests. Upon completion of all inspections and prior to acceptance by Owner, perform field tests outlined in Section 40 90 00, "Instrumentation Systems Basic Requirements."

3.05 DEMONSTRATION

- A. General. Before required tests may be performed, the Contractor, along with a qualified representative of the instrument supplier, shall thoroughly demonstrate to the Engineer and to the Owner's personnel the operation and maintenance of all items provided under this section.
- B. Features. Reliable and accurate operation of each pressure sensor and all specified accessories shall be demonstrated. This shall include accuracy, stability, and repeatability as specified over a range inclusive of the maximum (full scale, overflow, high alarm, etc.) and the minimum (low alarm, low stop) pressures which can occur without operator intervention.
- C. Continuity. Once a pressure sensor has demonstrated the specified features and accuracy, it shall demonstrate continuity of performance for three continuous successive days. The pressure sensor shall intentionally be exposed to conditions which provide the full range of variations. At a minimum, one daily excursion to high alarm and one daily excursion to low alarm shall be arranged. Each day during the demonstration an hourly validation of accuracy and all accessories shall be made by the Owner's Representative. The Contractor shall provide the equipment necessary for the Owner's Representative to manually validate the pressure. Nighttime validation shall occur as arranged by the Owner and Engineer. Any performance outside specified performance or any failure of any accessory shall cause the complete 3-day performance demonstration to begin again.
- D. Recording. Each pressure sensor being demonstrated by the Contractor shall be individually recorded on a 24 hour paper chart with minimum 4 inches of scale length. Discrete sensors shall be temporarily connected to provide a recording showing "on-off" changes in the sensor. Recording meters shall be certified accurate, demonstrated accurate, and provided by the Contractor for testing of the provided pressure sensors.

**PART 4 - - SCHEDULE**

A. GAUGE PRESSURE TRANSMITTER

Tag No.	Location	Quantity	Range (PSI)	Notes
PIT-XXX	Finish Water Header in Pump Gallery Lower Level	1	0-250	See drawing for location; reuse existing ¾" tap.

END OF SECTION

## SECTION 40 95 33

### SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM (SCADA) ADDITION

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.
- B. Related Sections. The following sections contain requirements that relate to this section.
  - 1. Division 26 "Electrical"
  - 2. Division 40 "Process Integration"
  - 3. Division 43

##### 1.02 DESCRIPTION OF WORK

- A. System Integrator. The existing City-wide water distribution SCADA including the Northeast WTP SCADA system were furnished and installed by Dublin Technical Systems of Dublin, OH whom also is providing maintenance services for the current systems. It is the intent of this specification for the contractors to retain the services of Dublin Technical Systems and carry them in the base bid to furnish, install and program the PLC-5/SCADA system hardware and software modifications and database configuration as required.
  - 1. The Contractor shall coordinate and provide assistance with the System Integrator to perform the scope of work as briefly described herein and outlined in Appendix II.
  - 2. Sole sourcing Dublin Technical Systems as the System Integrator does not exempt the Contractor from meeting all the requirements of the Contract Documents nor does it give any prior acceptance of any equipment, software or services.
- B. Furnishing supervisory control and data acquisition (SCADA) system, instrumentation, accessories, and equipment for municipal water system. The SCADA shall include but not limited to the following:
  - 1. System Integrator responsibilities include the following:
    - a. Modifications to the existing PLC-5 hardware and software to accept the additional digital and analog signals as shown on the drawings.
    - b. Provide the additional digital and analog I/O modules and accessories at existing PLC-5 as required.
    - c. Reconfiguration of the existing PLC-5 door mounted OIT screens to include the new process equipment as required. This shall include but not limited to the new high service pump #3 VFD, new flow control valve, and new pressure transmitter. The existing 24" magnetic flow meter, the existing insertion flow meter with differential pressure transmitter are to remain in service after the new flow control valve is installed.
    - d. Reconfiguration of the existing SCADA HMI software and database, screens, trending, alarms, reports, etc. to include the new process equipment as required. This shall include but not limited to the new high service pump #3 VFD, new flow control valve, and new pressure transmitter.
    - e. Operator training.
  - 2. Contractor responsibilities include the following::



- a. All conduits and wiring shall be furnished and installed by the Contractor.
- b. The flow control valve motor actuator and the pressure transmitter shall be furnished and installed by the Contractor.
- c. All pipe taps and interconnecting sensor piping shall be installed by the Contractor per details.
- d. The Contractor shall be responsible for coordinating the work performed by the System Integrator.
- e. The Contractor shall provide assistance with the testing and calibration.

### 1.03 GENERAL REQUIREMENTS

- A. No system shall be considered for approval or accepted which does not wholly fulfill the intent and requirements of the functional description, hardware, and software system as specified. Acceptance of an equal system must be by written acceptance of the Engineer. The Engineer reserves the right to request a full demonstration of any hardware, software, or other products which are submitted as approved equals prior to approval.
- B. The computer's function is that of a control and data acquisition system. However, it must be designed with flexibility to accommodate field changes and commissioned in accordance with this specification. Documentation drawings and spare parts shall be provided. The Contractor shall also provide in-plant training as described in Section 40 90 00. Training shall be included in the Scope of Work provided by the System Integrator.
- C. The Specifications and Drawings outline certain characteristics of the monitoring and control system but do not set forth all the details of system design and the various functions and equipment required. All equipment shall be complete with all necessary software, accessories, and appurtenances required for a properly operating system including all items recommended by respective manufacturers and not herein specified.
- D. The Contractor shall assume complete system responsibility through the System Integrator and provide all necessary coordination with all subcontractors.
- E. The Contractor shall coordinate the work of the System Integrator for the installation, interconnection, testing, and calibration of the instruments, and the scheduling of the System Integrator's personnel. The System Integrator shall also be responsible for assuring himself that this equipment properly meets the functional intent of the Contract Documents. Substitutions on functions specified are not acceptable.

### 1.04 EXCEPTIONS AND ALTERNATIVES

- A. The System Integrator shall offer a system in accordance with this specification. No exceptions written or implied will be made and the vendor shall be capable of meeting this specification as written.
- B. Should any of the specified manufacturers offer alternatives, equipment, or materials, he shall do so in accordance with the specifications, provide shop drawing for approval, and list each alternative separately defining the advantages of the alternative and the impact on the overall system configuration. The manufacturer shall provide proof that the use of alternatives would improve control system performance and reduce operating and maintenance costs.
- C. Where alternates are approved by the Owner and executed, the Contractor will be held responsible for all structural, mechanical, and electrical changes required for the installation of substituted items at no additional cost to the Owner.

#### 1.05 QUALITY ASSURANCE

- A. Codes and Standards. Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with the plans and as specified herein.
  - 1. National Electrical Manufacturers Association (NEMA) Compliance.
  - 2. National Electric Code (NEC) Compliance.
  - 3. International Society of Automation (ISA).
  - 4. Institute of Electrical and Electronic Engineers IEEE).
  - 5. Underwriters' Laboratories, Inc. (UL) Compliance and Labeling. Comply with provisions of UL safety standards pertaining to process controller equipment. Provide products and components which have been UL listed and labeled.

#### 1.06 GUARANTEE

- A. The complete system shall be guaranteed to meet or exceed the design and performance requirements of the specifications and the drawings.
- B. Equipment, software, and materials which do not achieve design requirements after installation shall be replaced or modified by the Contractor to attain compliance, at no additional cost to the Owner.
- C. All equipment warranties shall be guaranteed for twelve (12) months from date of Final Acceptance.

#### 1.07 EXPANDABILITY

- A. The system proposed shall be configurable to provide for minor changes and additions during manufacturing, installation, and commissioning phases, and on-site by the Owner's operating personnel.
- B. The system software shall be reconfigurable in the field. The SCADA system shall be reconfigurable using computer keyboard and fill-in-the-blanks technique. Systems requiring factory assistance or an off-site computer for reconfiguration are not acceptable.

#### 1.08 SUBMITTALS

- A. Submit shop drawings in accordance with Specification Section 01 33 00, "Submittals".
- B. Complete instrument and control system block diagrams, showing in schematic form, the interconnections between major hardware components. The block diagram shall reflect the total integration of all digital and analog devices in the system. The diagram shall reference all interconnecting cabling requirements for digital components of the system including any data communications links.
- C. All significant equipment to be supplied shall be listed followed by descriptive data sheets. The equipment list shall include, but not limited to, each component name, manufacturer, model number, a description of the operation, quantity supplied, and any special setup and operation and maintenance characteristics.
- D. Drawings of equipment to be supplied shall include, at a minimum, overall dimensional details for each unit including installation arrangements and door mounted operator devices including nameplate designations. Wiring diagrams of all PLC and other system equipment including field device connections and specific installation wiring responsibilities identified.
- E. Input/output drawings shall indicate terminal numbers and signal identification name.
- F. Arrange, identify, and bind all submittals complete with suitable index.

- G. Process Control Description Updates for Record Documents shall include all revised and updated process control descriptions following any PCS workshops, working sessions, and/or related submittal reviews, and updated continuously during programming, start-up and testing to reflect all refinements and changes that occur due to specific operational needs and the characteristics of specified equipment and systems supplied under this Contract.
- H. Software submittals shall provide a complete description of the system on a functional level. It is not the intent of this documentation to describe the individual programs.
- I. The software submittal shall cover the detailed control algorithms, plant reports, and process graphic displays that the system supplier has developed through meetings with the Engineer and the Owner.
- J. Prior to the software submittal, the software supplier shall meet with the Engineer and the Owner to review/modify function of all operations to tailor the software to this specific application. Specifically, at a minimum, this shall include the configuration of all displays, graphics, and operator interfacing. The function of all software process control and loops shall also be included. This process shall be repeated after the factory demonstration. The total time estimated for this work is one (1) eight (8) hour day. Travel and subsistence for software supplier shall be included in the bid for the SCADA system.

#### 1.09 TESTING AND TRAINING REQUIREMENTS

- A. Fabrication Testing (Not Used)
- B. Job Site Demonstration
  - 1. Following final installation and calibration of the system, the System Integrator shall perform a demonstration of system performance. Satisfactory performance shall require the system to perform control functions, monitoring and display functions, alarming, and printout functions for a period of not less than one (1) month of continuous operation. During this demonstration, any system failure or software-related problem(s) shall be corrected, and the demonstration resumed. Acceptance of the control system by the Owner shall require that the system operates continuously for a period of one (1) month without non-field or field repairable hardware or software interruption. Substantial completion shall not be awarded until after the Contractor has successfully completed the required tests specified herein, all O&M documentation has been submitted, all Owner's staff training programs have been completed, all as-built documentation, and spare have been provided.
- C. Training
  - 1. The System Integrator shall include at the site, operator and maintenance training for the facility's personnel as described in Section 40 90 00 and Contract Documents.
- D. System Calibration and Start-up
  - 1. The System Integrator shall provide the initial calibration and start-up of the control system by providing factory-trained personnel to perform the following:
    - a. Supervise the installation and verify the final connections of all signal and power wiring to and from the control system.
    - b. Perform all hardware calibration and diagnostic tests and make all necessary equipment connections.
    - c. Perform all configuration system tests, including diagnostics.
    - d. Perform the system acceptance test as described in the "Job Site Demonstration" section of this specification.

- e. Test the operation of the Communications Control System and Input/Output Subsystem.
- f. Verify the displays and functions of the control System at workstation computer and PLC's.

#### 1.10 OPERATION AND MAINTENANCE MANUALS

- A. The Contractor shall coordinate with the System Integrator to furnish Operation and Maintenance Manuals for the SCADA additions.
  - 1. These manuals shall be separately bound and shall contain all information required by the system operator to perform all functions related to this project. Manuals shall be available at the time of the operator's training course and shall be covered as part of the course material.
  - 2. The system operator's manual shall include all new SCADA screens and sub-screen shots in color each followed by monitoring and controls functional description for each new piece of equipment and instrument that are being controlled or monitored from the SCADA system.
- B. Electronic Documentation: Provide all final "as-built" application programs, PLC ladder logic diagrams complete with documentation, HMI screen and SCADA data base on two (2) USB Flash Drives with one (1) serving as a duplicate of the first.

#### 1.11 MAINTENANCE MATERIALS (NOT USED)

#### 1.12 GENERAL FUNCTIONAL DESCRIPTION

- A. The Supervisory Control and Data Acquisition (SCADA) system shall monitor and control the operations of the new High Service Pump #3, new flow control valve and the related new instruments as indicated on the Contract Drawings.
- B. The SCADA shall be configured to maximize flexibility in operation of the pumps. Multiple adjustable setpoints shall permit combinations of pump sequences varying from each pump operating at a separate setpoint to all the pumps operating at a single setpoint. In the case where more than one pump is controlled by the same setpoint, adjustable time delays shall be provided in software to prevent pumps from starting or stopping at the same time, which could result in damaging hydraulic surges and transient pressures.
- C. Adjustment of the pump setpoints, pump on/off control or operating sequences for all pumps shall be possible from the SCADA computers and the operator interface terminals.
- D. As a potential energy cost saving feature, the pumps shall be capable of operation on time-of-day control basis for off-peak operation of the pumps. Also, to prevent exceeding the established capacity of each water supply source, an adjustable run timer shall be provided in the software for each pump to limit the time per day that the pump is allowed to operate. These functions shall be selected via software selector switches.
- E. Automatic overriding of the peak power period timers for all the pumps shall be possible by an adjustable setpoint (i.e., tank low level alarm, etc.) during times when it is not desirable to wait until off-peak times to refill the storage tank.
- F. After a preset time delay, should the actual pump status disagree with "called" status, the pump fail alarm shall be activated.
- G. The new high service pump controls shall be divided into sub-systems and shall be controlled by stand-alone PLC-5, totally independent from the SCADA computers. All application programs for local process shall be configured and reside on the local PLC's processes and not at any workstation computers. The operators shall be able to control,

monitor, and view the process graphics for the new equipment from any workstation computer or from any PLC panel as required.

- H. Process variables, equipment status and alarm information shall be gathered from the Northeast water treatment facility and distribution system. Any changes to PLC's application programs, set point changes, override functions, alarm acknowledgment, etc. shall be possible from the local HMI/OIT or any SCADA computer over the communications medium.
- I. Adjustments of the process variables, pump setpoints, pump on/off control or operating sequences for all pumps, valves, and related process shall be possible from either the SCADA computer or the PLC via the local HMI panel or the local operator interface terminal.
- J. Process variables, equipment status and alarm information shall be gathered from the Northeast water treatment facility and distribution system. Any changes to PLC's application programs, set point changes, override functions, alarm acknowledgment, etc. shall be possible from the local HMI/OIT or any SCADA computer over the communications medium.
- K. Adjustments of the process variables, pump setpoints, pump on/off control or operating sequences for all pumps, blowers, valves, and related process shall be possible from either the SCADA computer or the PLC via the local HMI or local operator interface terminal.
- L. The SCADA servers and workstation computer HMIs shall allow the operators to perform data acquisition functions such as report generation, alarm management, trending, graphic presentation of process in real-time basis and control functions such as equipment on/off, set point changes on process variables, etc. The servers and computer shall also allow the override functions of control blocks upon the operator's command. Failure of the SCADA servers and computers shall not interrupt the operation of SCADA system in performing control and monitoring functions.
- M. The SCADA system shall allow the plant personnel to monitor all associated processes and to change setpoints as required. It shall also provide status conditions, alarm conditions, display of trend and selected loop display. The system shall perform totalizing the recording functions of selected process variables.
- N. The system shall have the capability of storing all process variables and shall provide either daily, weekly, or monthly printouts as selected by the operator. Status conditions display of trends and selected loop display shall be provided.

#### 1.13 FUNCTIONAL DESCRIPTION – APPLICATION PROGRAMS:

##### A. PLC-5:

- 1. Finished Water Flow Control Valve:
  - a. The Finished Water modulating valves shall be controlled from the SCADA and used to modulate the flow control to maintain a setpoint pressure in the Finished Water header. In AUTO the percent valve open shall be modulated via a software PID loop or in HAND the percent valve open shall be as selected by the operator to maintain the desired discharge pressure in the Finished Water Header.
- 2. Operation of existing High Service Pumps
  - a. High Service Pumps #1, #2, and #4 shall remain fully operational while High Service #3 is offline for the project. High Service Pump #3 new motor shall have the same monitoring, control, and alarm functions as the existing High Service Pumps 1, 2, and 4. This is in addition to monitoring and controlling the VFD.

- b. The operation of the high service pumps is combined with operation of the pump's discharge motor operated surge control ball check. SCADA will monitor and control open and close position of the valve, and alarm on a Fault in the local surge controls.
  - c. Software HOA selector switches and alternating function shall be provided with all four high service pumps. Run time for each pump will be indicated and totalized.
  - d. After a preset time delay, should the "actual" pump status disagree with the "called" status or the surge control valve status, then a pump fail alarm shall be activated.
  - e. The existing SCADA system shall continue to monitor the following functions for all four high service pumps:
    - 1) Pump status from each starter.
    - 2) Pump fail indication from each starter where applicable.
    - 3) Motor Winding High Temperature will trip Fault indication.
    - 4) H-O-A selector switch position
    - 5) Stop/Start push button
    - 6) Motor frequency and speed
    - 7) VFD alarms (High Service Pump 3 only)
  - f. The SCADA system shall output:
    - 1) Pump start-stop signal to the associated hydraulically operated ball check valve.
    - 2) Pump output signals to the VFD (High Service Pump 3 only)
  - g. The pump shall be interlocked to stop with the clear well low-level alarm.
  - h. After a preset time delay, should the "actual" pump status disagree with the "called" status, then a pump fail alarm shall be activated.
3. Variable Frequency Drive (VFD) control of High Service Pump #3:
- a. High Service Pump #3 will be controlled by a new VFD. When in AUTO, the VFD shall control the speed of the pump based on the operator set point for flow. The Finished Water Pressure Transmitter shall provide monitoring of the discharge pressure and alarm for high and low pressure setting selectable by the operator from SCADA.
  - b. High Service Pump #3 shall be operated by selecting a speed setpoint using a keypad in the VFD or from SCADA. The VFD speed setpoint shall be able to be set via LOCAL or REMOTE.
  - c. From SCADA, the operator shall have the ability to enter in a desired set point and the SCADA shall adjust the VFD speed to maintain the set point via a software PID loop.
    - 1) When a preset high or low pressure alarm set point is activated, the VFD shall adjust the pump speed to maintain the operator selected minimum or maximum allowable pressure setting.

- d. Alarms: SCADA System shall signal alarms for FAULT conditions due to a malfunction to the VFD equipment and shall alarm low and high set points for both pressure and flow.
4. Finished Water Pressure Transmitter:
- a. The pressure signal shall be transmitted from the new pressure transmitter that shall be installed on the existing finished water piping ¾" pipe tap as shown on the drawings.
  - b. The pressure reading shall be used to control the speed of the variable frequency drive for High Service Pump 3 or to modulate the position of the flow control valve to maintain a discharge pressure set point when the VFD is in HAND or running at constant speed.
  - c. The SCADA shall trend and tabulate hourly, daily and weekly pressure.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Prior to all work of this section, carefully inspect the existing facilities, and install work of all other trades and verify that all such work is complete to the point where installation may properly commence.
- B. The equipment shall be installed in accordance with the manufacturer's instructions and located as shown on the drawings, or as approved by the engineer. Local electrical shutoffs for power supplies to equipment shall be provided.
- C. Discrepancies
  - 1. In the event of discrepancy, immediately notify the engineer.
  - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- D. The control system and accessory equipment shall be installed in accordance with the manufacturer's instructions and located as shown on the drawings or as approved by the engineer.
- E. It shall be the responsibility of the manufacturer of this section to ensure compatibility with existing system. If additional equipment or wiring is necessary, it shall be done at no cost to the owner.

### **3.02 INSPECTION, STARTUP, AND TESTING SERVICES**

- A. Installation. Supervision and assistance to ensure that proper procedures are followed during installation of the system.
- B. Start-up. Energize and verify correct and satisfactory operation of all components of the system. This operation shall include verification of the accuracy of all inter-equipment wiring.
- C. The System Integrator shall provide all special tools, calibration equipment and labor required for the following:
  - 1. Checking the installation of all components before power is applied.
  - 2. Placing the software and hardware into operation and making necessary adjustment.
- D. Should the equipment fail to operate in accordance with the specifications and manufacturer's data, corrective measures shall be taken by the Contractor or the defective

equipment shall be removed and replaced with equipment which will satisfy the specified conditions.

- E. When all required approvals of this portion of the work have been obtained, and at a time designated by the owner, thoroughly demonstrate to the owner's maintenance personnel the operation and maintenance of all items installed under the work of this section.

### 3.03 COMMISSIONING

- A. Subsystem Commissioning. Place into operation all component subsystems. This operation shall include loading and placing into operation all CPU software and calibration of all system inputs and outputs. Simulation of system inputs and outputs that are not operational during this subsystem commissioning phase shall be allowed, provided that all of these simulated inputs/outputs shall be subsequently verified during the system commissioning operation.
- B. System Commissioning. Calibrate and place into operation the complete system. The validity of all data base information in the system shall be checked and corrected as part of this operation. Calibration of all process control loops external to the equipment being supplied by other equipment suppliers will be the responsibility of the contractor prior to system commissioning.

END OF SECTION



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**SECTION 43 21 00.01**  
**PUMP MOTORS, GENERAL**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.02 DESCRIPTION OF WORK

- A. Provide the labor, tools, equipment, and materials necessary to furnish and install the motor for High Service Pump 3 in accordance with the plans and the specifications.

1.03 QUALITY ASSURANCE

- A. Materials and workmanship shall be in accordance with the following standards as referenced herein.
  - 1. ANSI. American National Standards Institute.
  - 2. ASTM. American Society for Testing and Materials.
  - 3. AWS. American Welding Society.
  - 4. HI. Hydraulic Institute.
  - 5. IEEE. Institute of Electrical and Electronics Engineers.
  - 6. NEMA. National Electrical Manufacturers Association.
  - 7. AFBMA. Anti-Friction Bearing Manufacturers Association.
  - 8. API. American Petroleum Institute.

1.04 SUBMITTALS

- A. General
  - 1. Submit all required documents and materials in accordance with Section 01 33 00.
- B. The following submittal content and schedule requirements are required to be submitted.
  - 1. Shop Drawings and Product Data.
    - a. Motor shop drawing that includes dimensional data and a bill of materials, which shall be keyed to numbers to all components of the pump motor assembly identifying them by name and part or catalog number. No other submittal packages related to this equipment can be approved before this one.
    - b. Motor to Pump Adapter Assembly. The Pump Service Company shall coordinate the fabrication of a motor to pump adapter assembly to the new approved pump motor as required to mate the new motor to the existing pump stand. Fabrication and installation of the adapter is described in Section 43 21 14.01.
    - c. Submittal Package Contents.
      - 1) Product data.
      - 2) Shop drawings.
      - 3) Performance Data.

- a) Based on actual tests of similar equipment and include sufficient data to demonstrate suitability of both the pump and driver for the conditions specified.
  - b) The data shall include the type and make of pump, size, capacity, motor horsepower, motor speed, and performance curve.
- 2. Source Quality Control Documents.
  - a. Schedule. No equipment can leave the factory until this submittal package has been approved.
  - b. Submittal Package Contents.
    - 1) Motor shop test report.
  - c. Motor bearing calculations. The manufacturer shall provide a certified statement the ABMA B-10 bearing life is meet or exceed the specified requirements.
    - 1) Maximum allowable temperature, natural frequency, and bearing life calculations.
  - d. Provide certification that confirms the pumps have successfully passed tests specified. Certificates shall be certified by the manufacturer and shall be notarized, and be provided with product data.
- 3. Start-Up Preparation Documents.
  - a. Schedule. This submittal package must be approved before the equipment start-up may take place.
  - b. Submittal Package Contents.
    - 1) Initial operation and maintenance (O&M) manual.

#### 1.05 JOB CONDITIONS

- A. The existing High Service Pump # 3 pump motor is to be replaced. The existing motor is a 350 HP, 1,200 rpm, 4,160 volt constant speed motor. The new is motor is a 350 HP, 1,200 rpm, 480 volt, inverter duty induction motor suitable for operating using a new variable frequency drive motor controller.
- B. The new motor to pump adapter assembly which shall include all necessary adapters, couplings and guards to retrofit to existing High Service Pump # 3 motor base shall be provided per Section 43 21 14.01.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery
  - 1. Ship all units assembled as much as practical.
  - 2. Label all units with all labeling intact and legible with item name, model number, size, and manufacturer's name.
- B. Storage
  - 1. Store all units, accessories, and components in the manufacturer's original package, under cover and protected from damage.
  - 2. Maintain a grease coating on all bearings and shafts to prevent corrosion.
- C. Handling
  - 1. Handle all units and components in accordance with the manufacturer's instructions.

2. Use lifting rings and canvas harnesses for lifting to prevent scratching or abrading finished surfaces.

#### 1.07 SPECIAL WARRANTY (NOT USED)

### **PART 2 - PRODUCTS**

#### 2.01 MOTORS

- A. Manufacturer. Subject to compliance with the specifications, the pump motors shall be supplied by one of the following manufacturers:
  1. U.S. Motors.
  2. Reliance Electric/Baldor.
  3. Or approved equal.
- B. Performance
  1. Rated for variable speed or continuous duty as indicated in the Equipment Schedule and normal starting torque unless otherwise specified or shown.
  2. Temperature rise shall be in accordance with NEMA limits for the class of insulation, service factor, and enclosure specified.
  3. Rated for a frequency of 60 hertz (Hz).
  4. Performance shall conform to the requirements of NEMA MG1 Part 12 and shall be expressed as indicated in NEMA MG1-12.31, and a report for routine tests shall be submitted based on IEEE Test Procedure 112, Method B.
  5. Minimum 1.15 service factor rating unless noted otherwise.
  6. The pump brake horsepower (bhp) requirements shall not exceed the motor nameplate horsepower (hp) under the operating conditions as listed in the applicable Equipment Schedule.
  7. NEMA Premium Efficiency type except for submersible motors.
  8. Inverter Duty. All motors indicated by the equipment schedule for variable-speed duty shall have the following features in addition to those listed above.
    - a. Designed for use on pulse width modulated variable-frequency drives (VFDs) without external filters or cable length limitations.
    - b. Inverter-grade, 1,600-volt, Class F insulation.
    - c. Service factor of 1.0 when operated from a VFD.
    - d. Normally closed thermostat on stator windings.
    - e. Meeting requirements of NEMA MG1 Part 31.
- C. Assembly and Fabrication
  1. Minimum NEMA Class F insulation.
  2. Motor enclosures shall be as listed in the applicable equipment schedule. Motor enclosure notations are:
    - a. TENV – Totally enclosed nonventilated.
    - b. TEFC – Totally enclosed fan-cooled.
    - c. ODP – Open dripproof.

- d. WP-1 – Weather-protected No. 1.
- e. WP-2 – Weather-protected No. 2.
- 3. Provide and mark motor terminals as required for the application described in NEMA MG1 Section 2 and required in Division 26, "Electrical."
- 4. Space Heater. Required to be provided but it shall not be wired.
- 5. Motor Nameplate. Attach an aluminum or stainless steel nameplate to each motor clearly visible showing operational data in accordance with NEMA MG1.
- D. VFDs. Provide VFD as specified in Section 26 29 00, "Motor Controllers," and as shown.

## 2.02 ACCESSORY PRODUCTS

- A. Coupling. Connect pump and drive with a flexible coupling complete with Occupational Safety and Health Administration (OSHA) type guard. Coupling should be spacer type for horizontal pumps.
- B. RTD Motor Bearing Temperature Sensors
  - 1. Pump motor to include 100-ohm platinum resistance temperature detector (RTD) on upper thrust bearing and lower alignment bearing of motor for monitoring of temperature.
  - 2. Coordinate RTDs with instrument supplier.
  - 3. Mount RTDs at the factory before shipment to the job site.
- C. Vibration Sensors. Not required.
- D. Thermal Motor Protection. Include temperature switches for motors below 100 hp or stator windings and bearing reservoir RTDs for motors 100 hp and above.
  - 1. Temperature Switches.
    - a. Equip the motor with three embedded temperature switches in the stator.
    - b. Temperature switches shall be normally closed (NC) configuration.
    - c. Connect temperature switch wiring to terminals in the motor conduit compartment.
    - d. Incorporate temperature switch operation with the motor control.
    - e. Provide motor terminal box of adequate size to allow installation of motor terminal kits without interfering with terminals or damaging control wiring.
  - 2. Stator Windings and Main Bearing Oil Reservoir RTDs.
    - a. Equip the motor with 100-ohm platinum RTD installed in the stator windings (one per phase minimum) and in each main bearing oil reservoir.
    - b. Connect the RTD leads to the terminals in the motor conduit box.
    - c. Install temperature control relays in the motor controller compartment and incorporate with the motor controls.

## 2.03 FINISHES

- A. Exterior Surfaces. Shop-prime and field-finish all surfaces exposed after installation in accordance with Section 09 90 00, "Painting," including motors and accessories unless specified otherwise.

## 2.04 SOURCE QUALITY CONTROL

### A. Motor Shop Tests

1. Tests shall be performed in accordance with ANSI/IEEE Standard 112 and ANSI C52.1, parts 12 and 20 (NEMA MG1).
  - a. For every motor furnished under 30 hp, submit certified data.
  - b. For every motor furnished 30 hp and larger and less than 200 hp, submit a routine test report and certified data.
  - c. For every motor furnished 200 hp and greater, submit a full certified test report.
2. Test Report Requirements.
  - a. Routine Test Report. Includes running light current, power input, and high potential based on test data from each motor furnished that requires it.
  - b. Certified Data. Includes motor efficiency and power factor at 100 percent, 75 percent, and 50 percent of full load based on test data of a motor of identical design.
  - c. Full Certified Test Report. Includes full-load heat run, percent slip, running light current, locked rotor current, starting torque, efficiency and power factor at 100 percent, 75 percent, 50 percent full load, and winding resistance and high potential tests based on test data from each motor furnished that requires it.
3. Notify and afford the Engineer the opportunity to witness any required Full Certified Tests.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

- A. Site Verification of Conditions. Before installation of equipment, verify that:
  1. All clearances have been met.
  2. Bases, anchors, supports, and openings are located correctly and are of the proper size and material.
- B. Variations. Correct any variations from the requirements shown or required by the manufacturer at no additional cost to the Owner. Submit all methods of correction in writing.

### 3.02 PREPARATION

- A. Protect all surface areas from damage. Protect all finished floors with a waterproof, oil-resistant cover to prevent staining from oil and/or grease.

### 3.03 INSTALLATION

- A. General. Install motor to motor to pump adapter assembly in accordance with the manufacturer's instructions and the conforming shop drawings.
- B. Lubrication. Furnish and apply an initial supply of grease and oil as recommended by the manufacturer. Grease and oil the equipment throughout all testing until substantial completion.
- C. Interface with Other Products
  1. Complete all electrical power and control connections under Division 26, "Electrical."
  2. Paint the equipment in accordance with Section 09 90 00, "Painting."

3. Install and connect all piping.
4. Perform field quality control as specified in this specification.

### 3.04 REPAIRS/RESTORATION

- A. Repair or replace any damage to the pump or motor or chips, dents, scratches, stains, or other disfiguring of surrounding floors, walls, and/or accessories to the satisfaction of the Owner and/or Engineer at no additional cost to the Owner.

### 3.05 FIELD QUALITY CONTROL

#### A. Manufacturer's Field Service and Start-Up

1. A qualified representative of each equipment manufacturer shall start up the pumps in accordance with Section 01 79 00, "Start-up, Demonstration, and Training," including all field testing.
2. Representative from the Pump Service Company shall spend at least 1 day performing the required services when motor is being started up with the new VFD. Contractor to coordinate and schedule for the start-up to include the Owner, Engineer, Pump Service Company, SCADA integrator, and VFD vendor.

- B. Noise and Vibration limitations. For an acceptable installation, the pump and motor combination shall operate without excessive vibration, noise, or bearing temperatures, under the specified conditions. Guidelines to establish excessive pump vibration shall be as described in ANSI/HI 9.6.4.

- C. Visual. The Contractor, Owner, and/or Engineer shall inspect the equipment for visual deficiencies.

1. Verify and certify pump, driver, and coupling for proper connections, lubrication, and mechanical suitability for operation per manufacturer's recommendation.
2. Verify and certify baseplate and equipment for proper leveling, anchoring and grouting.
3. Verify and certify that all sensors and protective devices are operational and provide all needed protection for proper warranty.
4. Compare equipment nameplate data with drawings and specifications.
5. Inspect physical and mechanical condition.
6. Inspect for correct anchorage, mounting, grounding, connection and lubrication.
7. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data. Perform thermographic survey.
8. When applicable, perform special tests such as air gap spacing and pedestal alignment.
9. Verify the absence of unusual mechanical or electrical noise or signs of overheating during initial test run.
10. Verify proper installation, gapping and termination of all sensors provide as part of pump system.

### 3.06 CLEANING

- A. In accordance with Section 01 74 23, "Cleaning."
- B. Additional Requirements

1. Clean the motor, accessories, and surrounding areas of all foreign material, grease, and oil stains.
2. Remove all rags, sticks, debris, and construction materials. Replace damaged equipment components in like kind at no additional cost to the Owner.
3. After cleaning, provide protective covering for each piece of equipment.
4. All lubricants shall be drained and replaced prior to final acceptance. Cost of lubricants shall be paid by the CONTRACTOR and the grades of lubricants shall be in accordance with the manufacturer's standards.

### 3.07 CLOSEOUT ACTIVITIES

- A. Equipment Testing and Commissioning per Section 01 75 16.

### 3.08 PROTECTION

- A. Requirements

1. Be responsible for provisions to protect the pump, motor and materials after installation, but before acceptance by the Owner.
2. Protection of the equipment shall include provisions during installation and testing of nearby piping, valving, or other adjacent equipment.
3. Remove all protective measures installed after acceptance of the project.

END OF SECTION



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## SECTION 43 21 14.01

### PUMPS, VERTICAL TURBINE PUMP REHABILITATION FOR THE HIGH SERVICE PUMPS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

- A. General. Drawings and general provisions of the Contract, including General Conditions; Division 1; Section 43 21 00.01, "Pump Motor, General"; and all related specification sections, apply to this section.

##### 1.02 DESCRIPTION OF WORK

- A. This specification section describes the responsibilities and work to be performed by each party under their respective contract, including equipment, materials, handling, transporting, and equipment testing and commissioning. The Contractor shall retain Ohio Drilling, hereinafter referred to as the Pump Service Contractor, to provide rehabilitation of High Service Pump # 3. Existing High Service Pumps #1, #2, and #4 shall remain fully operational while High Service #3 is offline for the project. The work to be provided includes the following:
  - 1. The Contractor shall coordinate scheduling any planned outages to perform the work on the High Service Pumps by the Pump Service Company only after a work plan has been submitted and approved by the Owner and Engineer.
  - 2. The Contractor shall coordinate and provide assistance with the Pump Service Company to perform the scope of work as briefly described herein and outlined in Appendix I.
  - 3. Pump Service Company responsibilities include the following:
    - a. Provide shop drawing for the new 350 HP motor per Section 43 21 00.01, "Pump Motors, General" and Section 01 33 00, Submittals".
    - b. Provide the labor, tools, equipment, and materials necessary to remove the existing 350 HP, 1,200 RPM, 4,160 volt, constant speed motor on High Service Pump #3.
      - 1) Contractor to assist with handling and salvaging for Owner per Section 02 41 16 – Selective Demolition.
    - c. Furnish and install a new motor on High Service Pump # 3. Provide a new 350 HP, 1,200 RPM, 480 volt inverter duty motor for existing High Service Pump # 3 per Section 43 21 00.01, "Pump Motors, General."
    - d. Provide field verification of the existing mounting requirements for High Service Pump #3 pump stand. Provide a submittal drawing showing fabrication details and a bill of materials to fabricate a pump to motor adapter to be mounted to the existing pump stand. Furnish and install new pump to motor adapter and 480-volt motor for High Service Pump 3.
    - e. Provide assistance to the Contractor during dry testing of the motor to verify proper pump rotation. Install all couplings and guards to confirm alignment of the pump and motor.
    - f. Provide assistance to the Contractor during Equipment Testing and Commissioning per Section 01 75 16.

4. The Contractor shall be responsible for coordinating the work performed by the Pump Service Company to furnish and install a new pump to motor adapter and 480-volt motor for High Service Pump 3. The Contractor shall provide testing, start-up and commissioning of the equipment required to for the operation of High Service Pump 3.
5. The Contractor shall be responsible for all electrical work related to disconnecting and reconnecting power and controls for the High Service Pump #3 motor being replaced, controllers, and the new Variable Frequency Drive. Running new conduit and wiring for power and controls, and re-terminating, reconnecting, testing, and providing commissioning.
  - a. The Contractor shall be responsible for disconnecting power and controls to High Service Pump 3, securing wiring, and when motor is delivered reconnect power and controls to make pump operational.

#### 1.03 QUALITY ASSURANCE

- A. In accordance with Section 43 21 00.01, "Pump Motors, General."

#### 1.04 SUBMITTALS

##### A. General

1. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.

##### B. Submittal Package No. 1 – Shop Drawings and Product Data

1. Schedule and Work Plan. No other submittal packages related to this equipment can be approved before a schedule and work plan is submitted and approved.
2. Submittal package contents
  - a. Product Data.
  - b. Shop Drawings.

#### 1.05 JOB CONDITIONS

- A. Coordination with Other Work. Coordinate the scheduling of the work with WTP management and staff. Coordinate pump and motor removal with WTP maintenance staff.
- B. High Service Pumps 1, 2, and 4 shall remain operational. Only High Service Pump #3 shall be out of service while the existing motor is removed and the new motor installed.

#### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. General. Delivery, storage, and handling of equipment shall be in accordance with Section 01 60 00, "Materials and Equipment" and Section 43 21 00.01, "Pump Motors, General."

#### 1.07 SPECIAL WARRANTY (NOT USED.)

### **PART 2 - PRODUCTS**

#### 2.01 MATERIALS

##### A. Related Sections.

1. The Contractor and Pump Service Company, and Electrical Contractor shall furnish all materials and equipment used for refurbishing High Service Pump #3 in accordance with the requirements of other sections of this Specification Section 1 – 43.

##### B. Spare Parts. Not used.

**PART 3 - EXECUTION**

3.01 GENERAL

- A. In accordance with Part 1.02 – Description of Work and Section 43 21 00.01, “Pump Motors, General.”

**PART 4 - SCHEDULE**

4.01 HIGH SERVICE PUMPS NEW AND EXISTING INFORMATION

Total Rated Capacity	10 MGD
Low Flow	2.1 MGD
Pressure Required	72 psi – 82 psi
Number of Pumps:	4
Type:	Vertical Turbine (Peerless)
High Service Pump #1 , #2	4,900 gpm (7 MGD) @ 205’ TDH 350 HP, 1200 rpm, 4,160-volt, Induction Motor, Constant Speed
High Service Pump #3	4,900 gpm (7 MGD) @ 205’ TDH New 350 HP, 1200 rpm, 480-volt, Inverter Duty Induction Motor, VFD (Existing motor is 4,160 volt)
High Service Pump #4	2,450 gpm (3.5 MGD), 205’ TDH 250 HP, 1200 rpm, 4,160-volt, Induction Motor, Constant Speed

END OF SECTION

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# APPENDIX



# The Ohio Drilling Company

October 12<sup>th</sup>, 2023

Carl M. Seifried, PE  
Senior Project Manager  
Burgess & Niple

Dear Carl:

I'm writing to provide you with the quote you recently requested. Below is the cost breakdown for this work:

<b>350 Hp Motor Quote</b>	<b>Cost</b>
Motor Removal	\$3,850.00
<b>GE 350 hp. 1200 rpm, VHS Invertor Duty Motor</b>	<b>\$57,675.00</b>
New Motor Baseplate Adaptor	\$2,205.00
Shop Labor	\$2,850.00
Startup & Testing	\$12,000.00
Submittals & Drawings	\$2,800.00
Motor Install	\$4,850.00
<b>Total</b>	<b>\$86,230.00</b>

**350 hp. 1200 rpm, VHS Invertor Duty, 100-ohm winding and bearing RTD's Space heater, NRR, 17,150 lbs. thrust, 447TP 3/60/460**

**Estimated Delivery: 14-16 weeks after approval of submittals.**

If you have any questions regarding this or any other correspondence, please do not hesitate to contact me. Thank you for the opportunity to work on your water well and pump needs.

Sincerely yours,  
OHIO DRILLING COMPANY

By

Alex Thomas

Geologist

# APPENDIX II





# DUBLIN TECHNICAL SYSTEMS, INC.

Professional Engineering Services and Systems

October 10, 2023

Burgess & Nipple  
100 W. Erie Street  
Painesville, OH 44077

Attn: Carl Seifried, P.E.  
Senior Project Manager

Reference: City of Canton, OH  
Northeast WTP High Service Pump 3 & VFD Project

Dear Carl,

Dublin Technical Systems Inc (DTSI) is please to provide the following:

- Update existing SCADA Programming (PLC, PanelView, & Plant HMI) to add new I/O points as described.
- Provide submittals and As Built drawings.
- Modify existing PLC to change QTY 1 Analog Input module from 4-channel to 8-channel module to accommodate new Analog Inputs and an extra spare point.
- Modify existing PLC to change QTY 1 Analog Output module from 4-channel to 8-channel module to accommodate new Analog Outputs and an extra spare point.
- Update existing drawings to show new I/O
- Coordinate with contractor
- Provide software submittal coordination meeting per 409533-1.08.J.
- Coordinate with plant before and during installation as the PLC configuration will need to be updated and requires a shutdown.
- Provide startup, commission, & training as described.
- Provide one (1) pressure Transmitter.
- VFD setup and commissioning by electrical contractor
- Scope does **NOT** include work on Excel Reporter as it was not mentioned in specs.

**Total \$29,350.00**

**Notes:**

1. F.O.B. Shipping Point
2. Payment Terms Net 30 days.
3. Taxes, fees, permits are NOT included in this scope.

Sincerely,

Shadi Motasem,  
Chief Operating Officer  
smotasem@dublintechnsys.com

File: 2023101001.doc

## **Appendix C**

### **MANUFACTURERS OF MATERIAL AND EQUIPMENT TO BE FURNISHED AND EQUIPMENT DELIVERY SCHEDULE**

#### **City of Canton, Ohio Water Department Northeast Water Treatment Plant High Service Pump #3 and VFD Upgrade**

Specific equipment has been used in preparing the CONTRACT DOCUMENTS, establishing a minimum quality that is acceptable. The BIDDER must prepare its Base BID on equipment manufacturers listed below. The manufactures listed below is not a complete list of all equipment needed for the project; the BIDDER is responsible for reviewing the CONTRACT DOCUMENTS for all equipment required for a complete project. For Base BID equipment items that have only one manufacturer listed, that manufacturer's equipment shall be included in the Base BID. For Base BID equipment items that have more than one manufacturer listed, the BIDDER is required to indicate by an "X" in the spaces ( ) provided, the equipment proposed to be furnished as part of the Base BID. One "X" and one "X" only shall be entered for each separate Base BID category of material or equipment.

In addition to the BIDDERS selecting a BASE BID equipment item, BIDDERS may quote on alternative equipment by listing it under "Alternate Bid Equipment" for each separate category of material or equipment identified as a Base BID item. The BIDDER shall indicate its alternates by inserting the manufacturer's name in the space provided and inserting the dollar amount (in figures) in the column labeled "Deduct From Base BID." The BIDDER shall indicate the dollar amount for each alternate listed and shall include all money required to incorporate the alternate into the PROJECT.

The BID will be reviewed based on the Base BID equipment submitted. Alternative equipment will be reviewed after the BID is submitted as part of the submittal review process. The OWNER reserves the right to accept or reject any of the alternates proposed and if so, the BIDDER shall then supply equipment from one of the Base BID manufacturers identified on the list (in writing, and prior to the project is awarded and contract executed).

Each BIDDER is required to follow these directions. Any bidding form that is submitted not in compliance with these directions may be rejected by the OWNER and that BID not considered in determining award.

BIDDERS must complete all items.

Specification Section	Manufacturer of Equipment or Material	Deduct From Base Bid
<b>26 12 00</b>	<p><b>Medium Voltage Transformers</b></p> <p>( ) a. ABB Power Company Inc.</p> <p>( ) b. Cooper Power Systems</p> <p>( ) c. General Electric Co.</p> <p>( ) d. Maddox Industrial Transformers LLC</p> <p>Alternate Bid Equipment</p> <p>( ) e. Eaton, Cutler Hammer</p>	_____
<b>26 29 00</b>	<p><b>Low Voltage Motor Controllers</b></p> <p>( ) a. Allen Bradley</p> <p>( ) b. General Electric Co.</p> <p>( ) c. Siemens.</p> <p>( ) d. Toshiba</p> <p>( ) e. Danfoss</p> <p>Alternate Bid Equipment</p> <p>( ) f. Eaton, Cutler Hammer</p>	_____
<b>40 05 23</b>	<p><b>Process Valves</b></p> <p>Electric Operators</p> <p>(X) a. Auma Actuators Inc.</p> <p>Alternate Bid Equipment</p> <p>( ) b. Rotork IQ Multi-turn or IQT Quarter Turn Valves</p> <p>( ) c. Limitorque</p> <p>( ) d. E.I.M.</p> <p>( ) e. _____</p>	_____
<b>40 95 33</b>	<p><b>System Integrator/ Instrumentation Contractor</b></p> <p>(X) a. Dublin Tech</p> <p>Alternate Bid Equipment</p> <p>( ) b. Dmytryka Jacobs Engineers</p> <p>( ) c. RoviSys Building Technologies</p> <p>( ) d. Commerce Controls Inc.</p> <p>( ) e. _____</p>	_____
<b>43 21 14.01</b>	<p><b>Pumps, Vertical Turbine Pump Rehabilitation for the High Service Pumps</b></p> <p>Pump Service Company</p> <p>(X) a. Ohio Drilling Company</p> <p>Alternate Bid Equipment</p> <p>( ) b. _____</p>	_____

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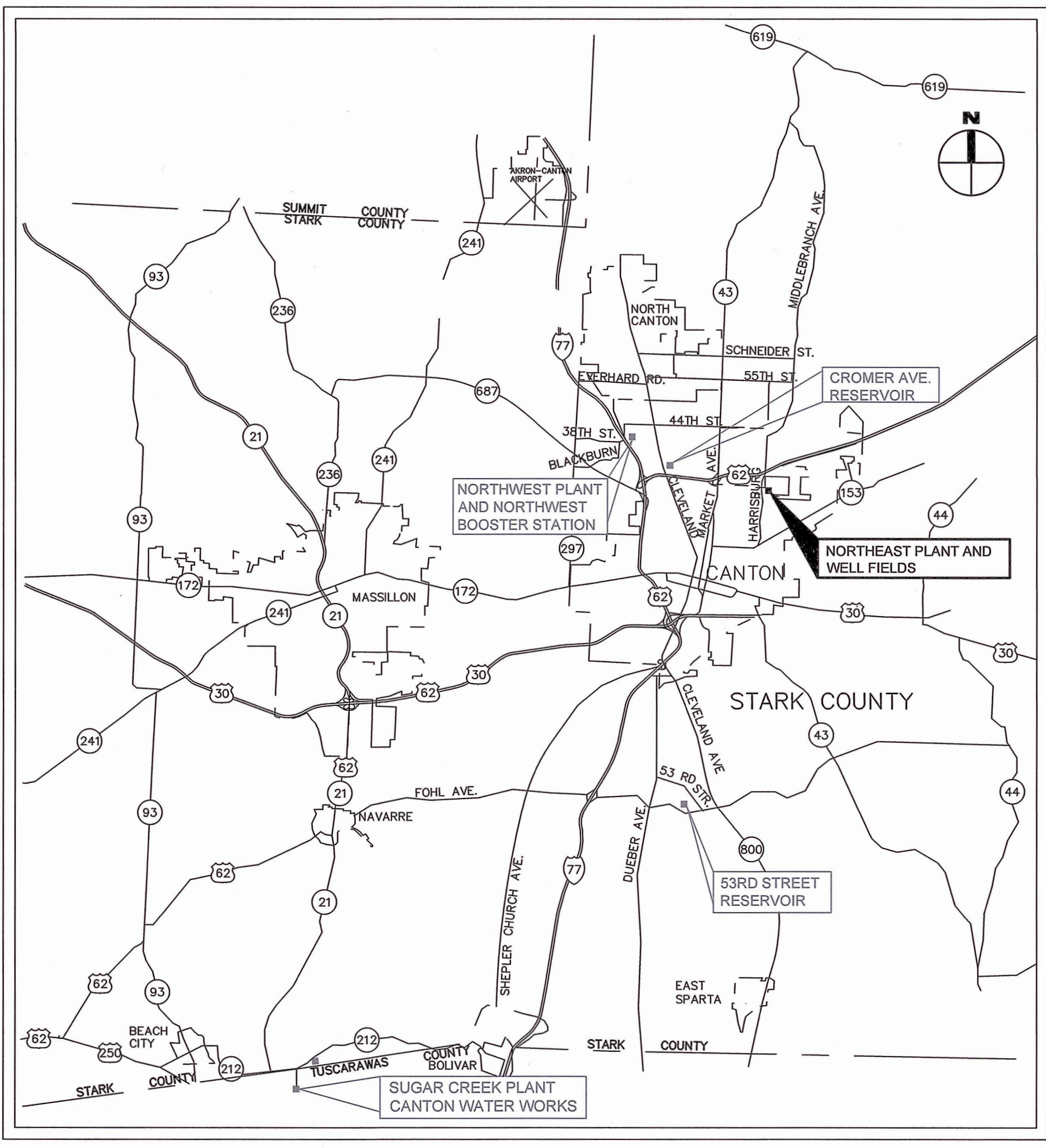
# CITY OF CANTON, OHIO WATER DEPARTMENT

## NORTHEAST WATER TREATMENT PLANT HIGH SERVICE PUMP #3 & VFD UPGRADES

### OCTOBER 2023

**BURGESS & NIPLÉ**  
100 WEST ERIE STREET  
PAINESVILLE, OHIO 44077

CITY OF CANTON, OHIO  
WATER DEPARTMENT  
NORTHEAST WATER TREATMENT PLANT  
HIGH SERVICE PUMP #3  
AND VFD UPGRADE



**LOCATION MAP**  
NORTHEAST WATER TREATMENT PLANT  
2664 HARRISBURG RD. NE  
CANTON, OH  
STARK COUNTY

INDEX OF SHEETS	
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P-2	PUMP BUILDING PLAN AT EL. 1062.00
P-3	PROPOSED PIPING PLAN AT EL. 1075.00
E-1	GENERAL NOTES, SYMBOLS, & ABBREVIATIONS
E-2	EXISTING MODIFIED ELECTRICAL ONE-LINE DIAGRAM 5KV SWITCHGEAR
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E-5	WIRING DIAGRAMS
E-6	ELECTRICAL DETAILS

**CANTON CITY OFFICIALS:**

- |                                   |                    |
|-----------------------------------|--------------------|
| MAYOR                             | THOMAS M. BERNABEI |
| DIRECTOR OF PUBLIC SERVICE        | JOHN HIGHMAN       |
| CANTON WATER DEPT. SUPERINTENDENT | TYLER S. CONVERSE  |
- 
- MEMBERS OF CANTON CITY COUNCIL:
- |                   |                   |
|-------------------|-------------------|
| COUNCIL PRESIDENT | WILLIAM SHERER II |
| WARD 1            | GREG HAWK         |
| WARD 2            | BRENDA KIMBROUGH  |
| WARD 3            | JASON SCAGLIONE   |
| WARD 4            | CHRIS SMITH       |
| WARD 5            | ROBERT FISHER     |
| WARD 6            | KEVIN HALL        |
| WARD 7            | JOHN MARIOL II    |
| WARD 8            | PETER FERGUSON    |
| WARD 9            | FRANK MORRIS      |
| AT LARGE          | BILL SMUCKLER     |
| AT LARGE          | JAMES BABCOCK     |
| AT LARGE          | LOUIS GIAVASIS    |

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CALL TWO WORKING DAYS  
BEFORE YOU DIG

CALL  
1-800-362-2764  
(TOLL FREE)

OHIO UTILITIES PROTECTION SERVICE  
NON-MEMBERS  
MUST BE CALLED DIRECTLY

OIL & GAS PRODUCERS PROTECTIVE  
SERVICE CALL: 1-800-925-0988

**PLAN APPROVALS:**

THIS PROJECT IS APPROVED BY THE CITY OF CANTON WATER DEPARTMENT THIS 24 DAY OF October, 2023 TC

*Tyler S. Converse*  
\_\_\_\_\_  
TYLER S. CONVERSE,  
WATER DEPARTMENT SUPERINTENDENT  
P.O. BOX 7904  
2664 HARRISBURG ROAD NE  
CANTON, OHIO 44705

PLANS PREPARED BY:

*Carl M. Seifried*  
\_\_\_\_\_  
CARL M. SEIFRIED, P.E./OHIO E-38583

DATE

NO.	DESCRIPTION	DATE

JOB NO: PR60961  
DATE: OCT. 2023  
DESIGNED BY: PJE  
DRAWN BY: PJE  
CHECKED BY: CMS  
APPROVED BY: CMS  
SCALE: NONE

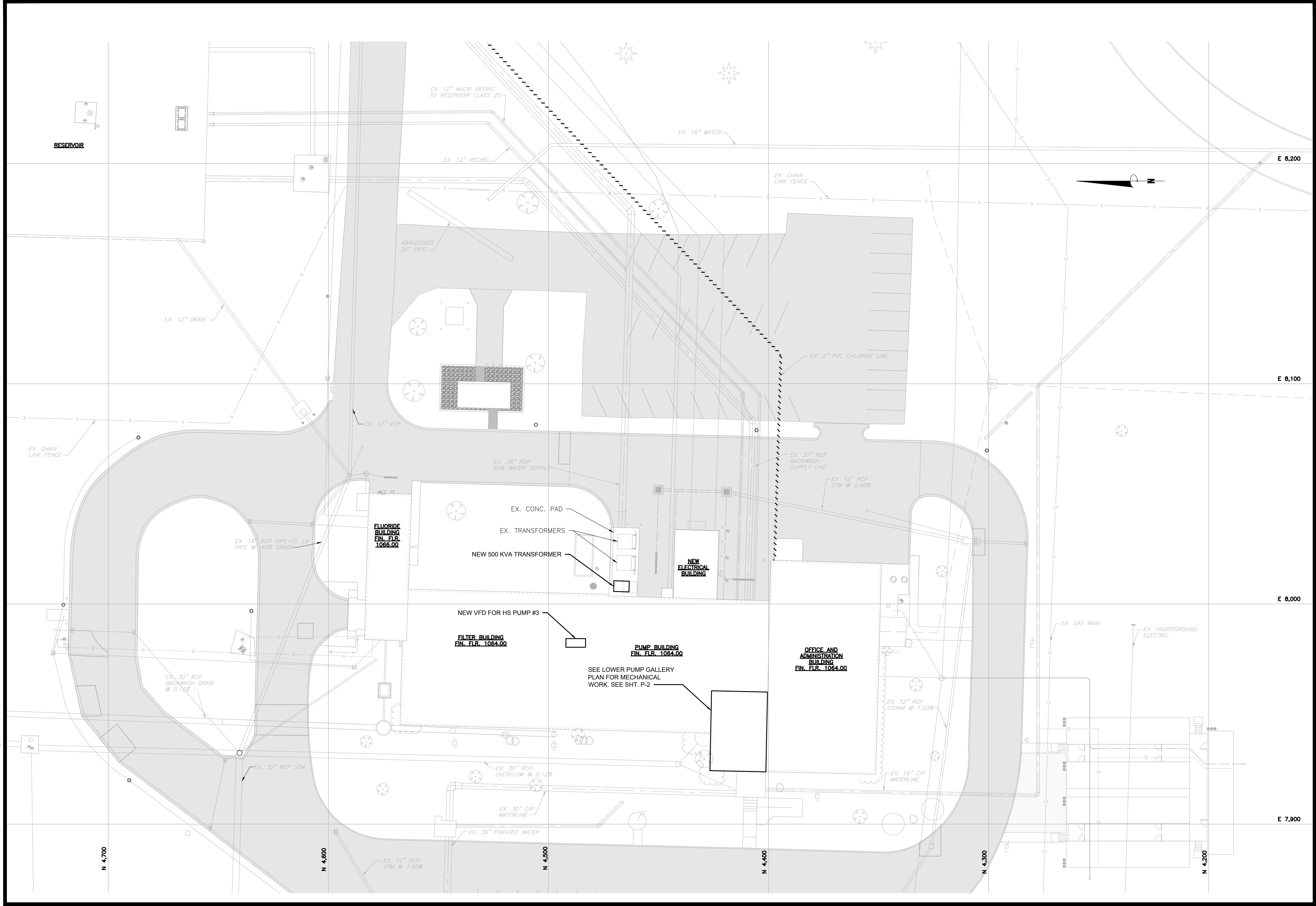
TITLE SHEET

G-1

SHEET: 1 OF 10

P:\PR60961\Cadd\Sheets\1\TITLE SHEET.dwg 10/17/2023 10:37:17 AM Paul Emerson

ELECTRICAL SHEETS



**BURGESS & NIPLÉ**  
 100 WEST ERIE STREET  
 PAINESVILLE, OHIO 44077

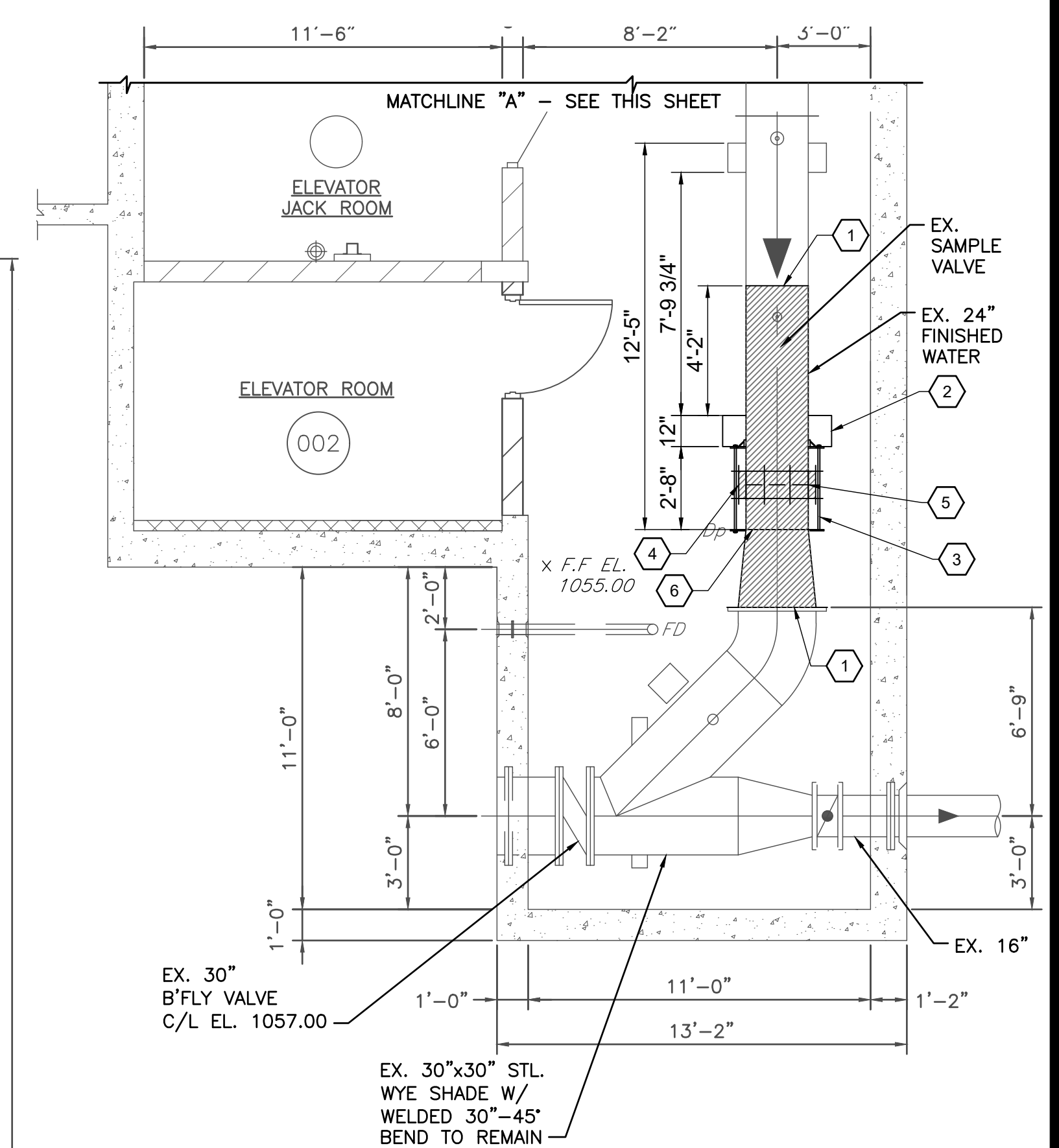
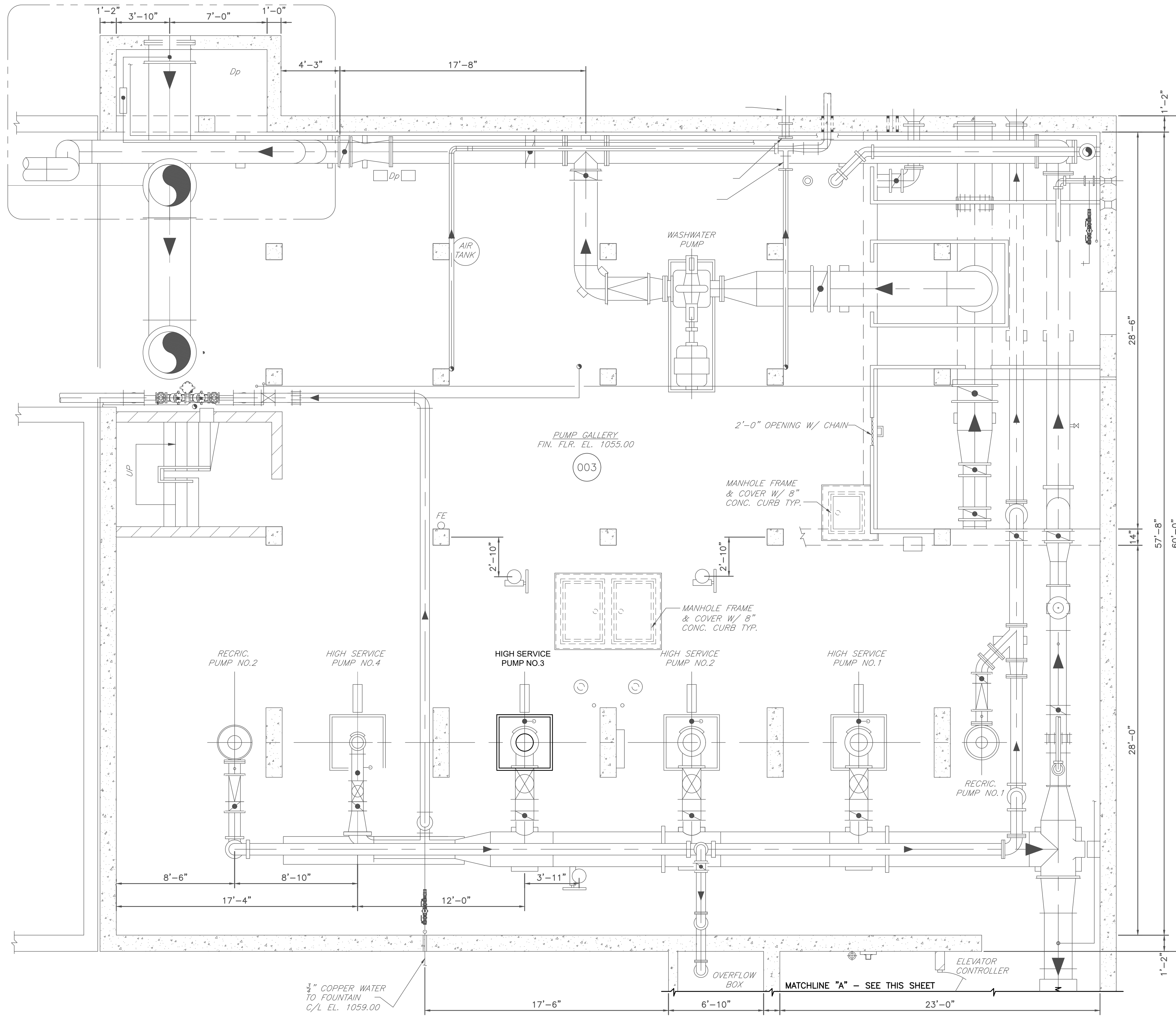
CITY OF CANTON, OHIO  
 WATER DEPARTMENT  
 NORTHEAST WATER TREATMENT PLANT  
 HIGH SERVICE PUMP #3  
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JOB NO: PR60961  
 DATE: OCT. 2023  
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 DRAWN BY: PJE  
 CHECKED BY: CMS  
 APPROVED BY: CMS  
 SCALE: 1" = 20'

CIVIL SITE  
 PIPING PLAN

**P-1**  
 SHEET: 2 OF 10



**CODED NOTES:**

- CUT EXISTING 2" THICK FOAM PIPE INSULATION FROM PIPE, FLANGES, AND PIPING AND REMOVE BETWEEN THE LIMITS SHOWN ON THE DRAWINGS. THIS MATERIAL WILL NOT BE REUSED. CLEAN ANY REMAINING ADHESIVE OR TAPE FROM THE PIPE SO THE PIPE CAN BE REINSULATED WHEN NEW WORK IS COMPLETE.
- EXISTING CONCRETE PIPE SUPPORT TO REMAIN.
- SCHEDULE OUTAGE #1 LASTING NO LONGER THAN 8-HOURS. CITY TO OPERATE 30" AND 16" VALVES AND DRAIN HEADER. REMOVE EXISTING RESTRAINT RODS BETWEEN PIPE LUGS AND FLANGE OF 24"x30" REDUCER.
- LOOSEN GASKET RETAINER BOLTS AND SLIDE SLEEVE COUPLING BACK TO EXPOSED END OF MAIN HEADER AND MAKEUP PIECE. MEASURE DISTANCE FROM FLANGE TO END OF MAKEUP PIECE TO CONFIRM WHETHER PIPE CAN BE REUSED OR MUST BE CUT OR MODIFIED TO CONNECT HEADER PIPE TO VALVE USING DRESSER FLANGED PIPE ADAPTER. SLIDE COUPLING BACK INTO PLACE AND TIGHTEN GASKET RETAINER TO PROVIDE WATER TIGHT CONNECTION. REINSTALL RESTRAINT RODS, CHECK FOR LEAKS, AND NOTIFY CITY THE WORK IS COMPLETE AND THE 30" AND 16" VALVES CAN BE OPENED SO THAT HIGH SERVICE PUMPING CAN RESUME.
- IF NECESSARY, CUT EXISTING MAKEUP PIECE TO ALLOW VALVES, GASKETS, AND FLANGED PIPE ADAPTER TO BE INSTALLED. TO MAKE EVEN CUT PERPENDICULAR WITH THE BARREL OF PIPE. LOCATION OF THE PIPE CUT SHALL BE COORDINATED WITH LAYING LENGTH OF VALVES, CLEARANCES FOR FLANGE GASKETS, AND REQUIRED CLEARANCES TO PROPERLY POSITION FLANGED ADAPTER COUPLING OVER END OF CUT PIPE REQUIRED TO PROVIDE FOR INSTALLATION OF PIPE FLANGED PIPE ADAPTER AND NEW 24" BUTTERFLY VALVE.
- SCHEDULE OUTAGE #2 LASTING NO LONGER THAN 24-HOURS TO INSTALL VALVE AND FLANGE ADAPTER. CITY TO OPERATE VALVES AND DRAIN HEADER. UNBOLT THE 24" FLANGES OF EXISTING PIPE COUPLING AND EXISTING 24" X 30" INCREASER. UNBOLT FOLLOWER BOLTS ON COUPLING AND SLIDE BACK THE FOLLOWER RING ONTO THE PIPE. REMOVE THE SHORT SECTION OF PIPE TO BE REMOVED TO INSTALL THE NEW FLANGE PIPE COUPLING ADAPTER AND BUTTERFLY VALVE. GRIND EDGES OF REMAINING END OF PIPE FOR SMOOTH END TO MATE PROPERLY WITH FLANGE PIPE COUPLING ADAPTER TO PROVIDE A WATERTIGHT CONNECTION.

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SCALE: AS NOTED

PUMP BUILDING  
PLAN @ EL. 1062.00

GENERAL NOTES

- PRIOR TO THE START OF THE OUTAGE TO COMPLETE THE REQUIRED INSTALLATION WORK, ALL PREPARATORY WORK SHALL BE PERFORMED IF POSSIBLE.
  - REMOVE PIPE INSULATION TO EXPOSE EXISTING PIPE, COUPLING AND FLANGES.
  - FIELD MEASURE AND VERIFY EXISTING CONDITIONS. OBTAIN CRITICAL MEASUREMENTS AND DIMENSIONS TO PLAN THE NEW WORK.
  - PROVIDE LAYOUT SKETCH SHOWING LOCATION OF PIPE CUT, LAYING LENGTHS OF VALVE, FLANGE ADAPTER COUPLING, RESTRAINT LUGS, AND TIE RODS.
  - SKETCH TO SHOW CLEARANCES FOR VALVE ACTUATOR.
  - SKETCH TO MARK LOCATION OF PIPE CUT, IF REQUIRED.
- THE CONTRACTOR SHALL PROVIDE A SCHEDULE TO THE OWNER IN ADVANCE OF COMMENCING ANY DEMOLITION WORK TO THE EXISTING PIPING, AND A DETAILED WORK PLAN FOR MAKING THE PIPE MODIFICATION AND COMPLETING THE INSTALLATION OF THE FLANGE ADAPTER COUPLING AND NEW VALVE.
- CONTRACTOR TO CONFIRM ALL NECESSARY MATERIALS ARE ON SITE INCLUDING FLANGE PIPE ADAPTER COUPLING, PIPE RESTRAINING RODS AND LUGS, GASKETS, BOLTS, AND FASTENERS PRIOR TO START OF ANY WORK FOR PLANNED PERFORMED DURING PLANNED OUTAGE.
- REMOVE EXISTING FOAM INSULATION TO THE LIMITS SHOWN ON THE PLANS TO INSPECT THE PIPE AND LOCATE FITTINGS, COUPLINGS, FLANGES, AND SUPPORT TO CONFIRM CLEARANCE REQUIREMENTS FOR INSTALLATION OF NEW 24" BUTTERFLY VALVE AND FLANGED ADAPTER. INSULATION WILL BE REPLACED WITH 2" OF NEW FOAM INSULATION WHEN NEW WORK IS COMPLETE. STEEL PIPE WILL BE CLEANED AND PAINTED IN ACCORDANCE WITH SPEC SECTION 09 90 00 PRIOR TO INSTALLATION OF FOAM PIPE INSULATION. OUTER COVER OF PIPE INSULATION WILL BE PAINTED AFTER ALL WORK IS

COMPLETE TO MATCH EXISTING PIPE INSULATION.

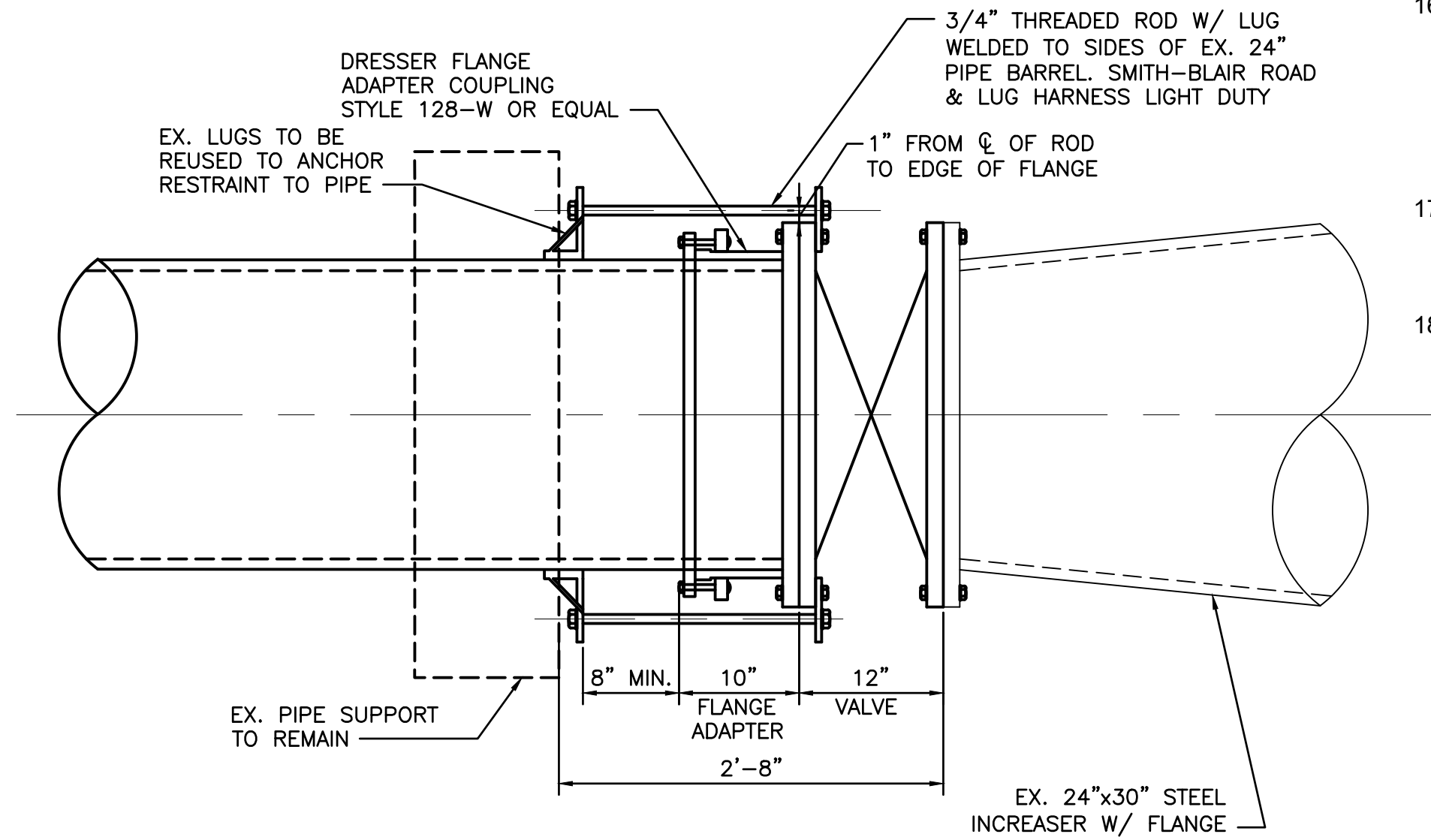
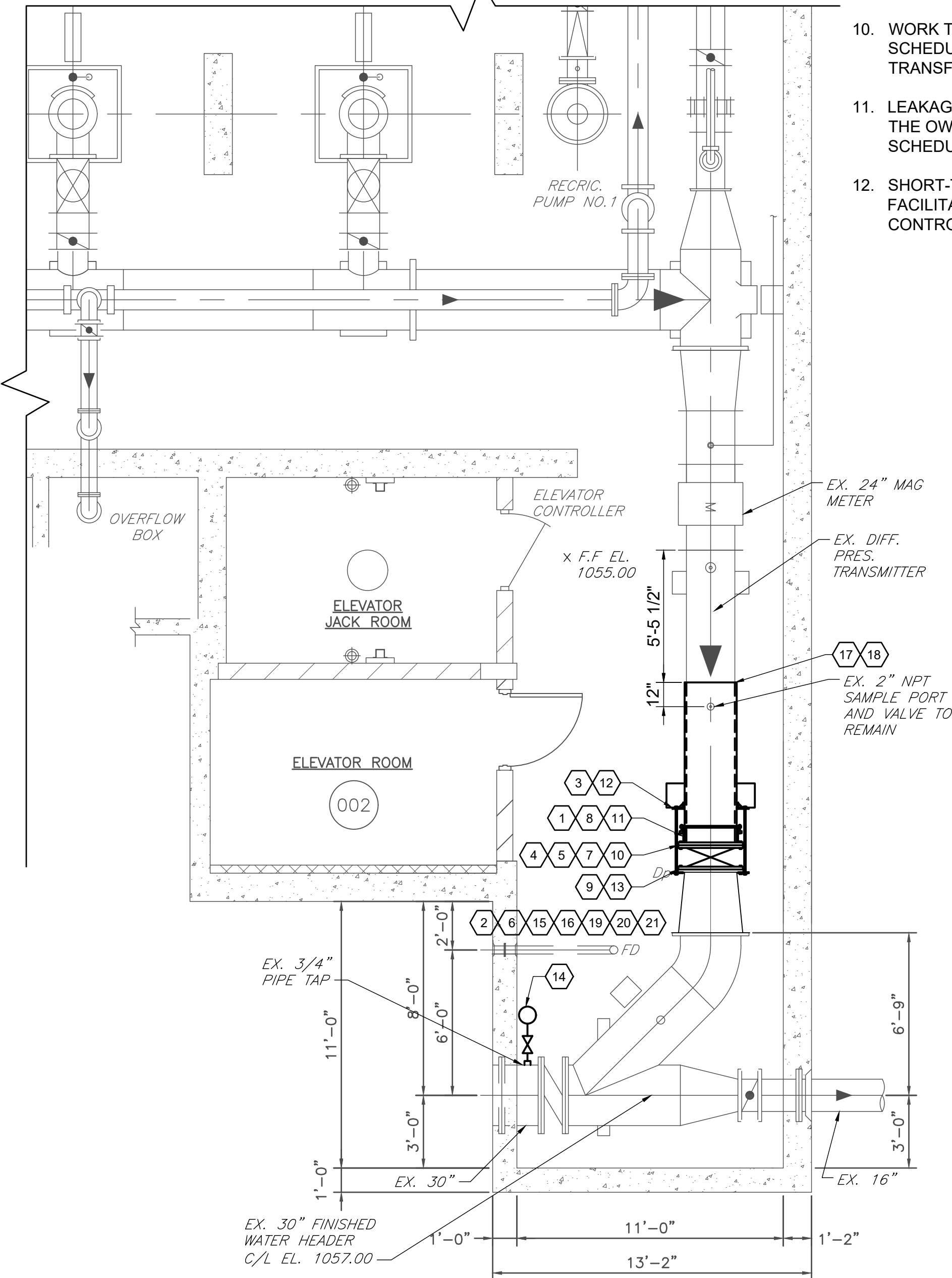
- COORDINATE SCHEDULE OUTAGES WITH CITY. CITY TO OPERATE 30" AND 16" VALVES AND DRAIN FINISHED WATER HEADER PRIOR TO STARTING OUTAGES.
- THE EXISTING 30" AND 16" BUTTERFLY VALVES SHALL BE CLOSED PRIOR TO THE START OF MAKING ANY MODIFICATIONS OR CUTTING INTO THE EXISTING 24" FINISHED WATER HEADER TO PREVENT BACKFLOW FROM THE WATER DISTRIBUTION SYSTEM. THE CONTRACTOR WILL COORDINATE WITH THE OWNER TO HAVE THE 16" AND 30" BUTTERFLY VALVES CLOSED AND THE 24" FINISHED WATER HEADER DRAINED PRIOR TO THE START OF WORK DURING THE SCHEDULED 24-HOUR OUTAGE PERIOD.
- CONTRACTOR SHALL INSTALL THE NEW VALVE AND OPERATE THE VALVE THROUGH FULL OPEN TO CLOSED POSITIONS TO INSURE IT IS SEATED PROPERLY. THE VALVE SHALL REMAIN CLOSED UNTIL THE LEAKAGE AND DISINFECTION TESTS ARE COMPLETE. UPON COMPLETION, THE VALVE WILL BE OPENED, BUT THE 16" AND 30" BUTTERFLY VALVES WILL REMAIN CLOSED UNTIL THE OWNER RESTARTS THE PUMPS, AND THEN OPENS THE VALVES TO RESTORE THE PUMPING FINISHED WATER TO THE DISTRIBUTION SYSTEM.
- PRIOR TO OPENING THE 16" AND 30" BUTTERFLY VALVES, THE 24" FINISHED WATER HEADER SHALL BE PRESSURIZED TO TEST FOR LEAKS, AND REPAIR ANY DEFECTS UNTIL NEW WORK PASSES LEAKAGE TEST.
- IF THE NEW ACTUATOR AND ADAPTER PLATE ARE NOT AVAILABLE OR TO BE INSTALLED AT LATER DATE, THE CONTRACTOR SHALL HAVE HANDWHEEL, T-WRENCH, DRILL, OR OTHER MEANS TO OPEN THE VALVE TO RESTORE FLOW WITHIN THE ALLOWABLE 24 HOUR SCHEDULED OUTAGE.
- WORK THAT DOES NOT HAVE TO BE PERFORMED DURING THE OUTAGE WILL BE SCHEDULED BASED ON BEST AVAILABLE DELIVERY DATES FROM SUPPLIERS OF THE TRANSFORMER, VFD, VALVE ACTUATOR, AND PRESSURE TRANSMITTER.
- LEAKAGE AND DISINFECTION OF THE PIPING AND VALVE WILL BE COORDINATED WITH THE OWNER, AND TESTING, COMMISSIONING, CALIBRATION, AND TRAINING WILL BE SCHEDULED AS EQUIPMENT IS INSTALLED AND READY TO OPERATE.
- SHORT-TERM OUTAGES WILL BE ALLOWED TO MAKE ELECTRICAL CONNECTIONS OR FACILITATE TESTING AND COMMISSIONING OF THE VALVE ACTUATOR, VFD, PUMP CONTROLS, OR SCADA SYSTEM CONFIGURATION AND PLC PROGRAMMING.

CODED NOTES - NEW WORK:

- REMOVE PIPE INSULATION TO LIMITS SHOWN ON PLANS. CONFIRM THE OD OF THE 24" STEEL PIPE PRIOR TO ORDERING THE DRESSER STYLE 128-W FLANGED PIPE.
- SCHEDULE OUTAGE #1 LASTING NO LONGER THAN 8 HOURS TO CONFIRM LOCATION OF EXISTING PIPE CUT UNDER THE EXISTING PIPE SLEEVE.
- UNBOLT AND REMOVE TWO 1" THREADED RESTRAINING RODS CONNECTING THE PIPE LUGS AT THE PIPE SUPPORT END WITH THE TWO TABS BOLTED TO THE FLANGES OF THE 24"x30" INCREASER.
- MEASURE THE LOCATION OF THE END OF THE EXISTING 24" PIPE THAT WILL MATE TO THE NEW BUTTERFLY VALVE TO DETERMINE WHETHER THE EXISTING PIPE NEEDS TO BE CUT TO INSTALL THE NEW 24" BUTTERFLY VALVE AND DRESSER STYLE 128-W PIPE ADAPTER OR CAN BE USED WITHOUT CUTTING THE 24" PIPE. REINSTALL THE PIPE SLEEVE AND RESTRAINING RODS. TEST FOR LEAKS AND THEN PLACE THE THE PUMP STATION BACK IN SERVICE.
- LAYOUT THE 24" BUTTERFLY VALVE LAYING LENGTH, INCLUDING ALLOWANCES FOR FLANGE GASKETS. ADD THE REQUIRED CLEARANCE BETWEEN THE VALVE AND THE PIPE TO PROPERLY SET THE FLANGE COUPLING ADAPTER SLEEVE OVER THE CUT PIPE PER THE MANUFACTURER'S RECOMMENDATION.
- SCHEDULE OUTAGE #2 TO BE COMPLETED WITHIN A SCHEDULED 24-HOUR PERIOD.
- IF NECESSARY, CUT THE PIPE CLEAN AND PERPENDICULAR TO THE

- BARREL OF THE 24" PIPE. GRIND ALL EDGES OF THE PIPE SMOOTH, AND BRUSH CLEAN THE PIPE BARREL PRIOR TO INSTALLING THE FLANGE ADAPTER.
- FURNISH AND INSTALL NEW DRESSER STYLE MODEL 128-W FLANGE ADAPTER COUPLING WITH LOCK PINS THAT ARE DESIGNED TO PROVIDE ANCHORAGE TO THE PIPE. SLIDE THE DRESSER FOLLOWER RING AND WEDGE GASKET OVER THE 24" STEEL PIPE, INSTALL THE DRESSER FLANGE ADAPTER COUPLING SLEEVE WITH FLANGE OVER THE PIPE AND ALIGN BOLT HOLES OF FLANGE ADAPTER WITH THE NEW BUTTERFLY VALVE.
- INSTALL NEW 24" FLANGED BUTTERFLY VALVE (PROVIDED BY OWNER) AND GASKET TO ALIGN WITH THE HOLES IN THE EXISTING 24" x 30" REDUCER. AND TIGHTEN BOLTS AND FASTENERS.
- INSTALL THE GASKET BETWEEN THE DRESSER FLANGED ADAPTER AND THE VALVE AND TIGHTEN THE BOLTS TO DRAW THE ADAPTER UP TO THE VALVE AND PROVIDE A WATERTIGHT CONNECTION.
- TIGHTEN THE FOLLOWER BOLTS ON THE DRESSER COUPLING TO DRAW THE FOLLOWER UP AGAINST THE LUGS TO SEAT THE WEDGE GASKET AND FORM A WATERTIGHT SEAL. TIGHTEN THE LUG RESTRAINTS TO THE BODY OF THE FLANGED ADAPTER.
- FURNISH AND INSTALL NEW 304 SS TABS FOR 1" DIAMETER 304 SS THREADED RODS AND FASTENERS TO BE INSTALLED BETWEEN THE EXISTING RESTRAINT LUGS ON THE PIPE AND THE FLANGE OF THE 24" BUTTERFLY VALVE AS SHOWN ON THE PLANS.

- INSTALL MOTOR ACTUATOR ADAPTER PLATE TO BE FABRICATED BY MOTOR ACTUATOR SUPPLIER FOR MOUNTING NEW 120-VOLT MODULATING MOTOR ACTUATOR. INSTALL NEW MOUNTING PLATE AND MODULATING MOTOR ACTUATOR ON VALVE. CHECK MANUAL HANDWHEEL OPERATION OF THE VALVE AND LEAVE IN CLOSED POSITION FOR LEAK TESTING AND DISINFECTION.
- REMOVE 3/4" NPT PLUG VALVE PIPE TAP ON 30" FINISHED WATER HEADER, AND INSTALL 3/4" x 1/2" BRASS REDUCER BUSHING. PROVIDE NEW 1/2" BALL VALVE, PIPE COUPLINGS, FITTINGS, AND 1/2" COPPER PIPING FOR SENSOR LINE TO CONNECT TO NEW PRESSURE TRANSMITTER WITH DIGITAL READOUT MOUNTED ON WALL
- PERFORM LEAKAGE TESTING AND REPAIR ANY DEFICIENCIES. REPEAT TEST UNTIL PIPING, VALVES, AND COUPLING ARE WATERTIGHT AND HOLD PRESSURE TO MEET TEST REQUIREMENTS.
- COORDINATE DISINFECTION WITH CITY THAT WILL PROVIDE CHLORINE FOR DISINFECTION TESTING, COLLECT SAMPLES, AND PERFORM TESTING AND REPORT RESULTS PRIOR TO RETURNING FINISHED WATER PUMP STATION TO FULL SERVICE. CONTRACTOR TO ASSIST WITH IDENTIFYING SOURCES OF CONTAMINATION, DISASSEMBLING AND MAKING NECESSARY REPAIRS, OR TAKING CORRECTIVE ACTION IN TIMELY MANNER UNTIL THE DISINFECTION TEST IS SUCCESSFUL AND THE SYSTEM CAN BE PLACED INTO OPERATION.
- WRAP AND SEAL ALL JOINTS, INCLUDING FLANGES, FITTINGS, AND VALVES, WITH 2" OF NEW FOAM INSULATION TO MATCH EXISTING INSULATION, SEAL JOINTS WITH ADHESIVE GLUE AND OR TAP TO MAKE AIRTIGHT JOINT.
- PAINT 24" STEEL PIPE AND FITTINGS PRIOR TO INSTALLATION OF FOAM INSULATION TO MATCH EXISTING PIPE INSULATION. AFTER INSULATION IS WRAPPED AND SEALED, COAT INSULATION PER PAINT SPEC 09 90 00.
- UPON COMPLETION OF THE WORK, THE CITY WILL BE RESPONSIBLE FOR STARTING THE PUMPS, OPENING THE NEW 24" VALVE, AND THE 16" AND 30" BUTTERFLY VALVES THAT CONNECT TO THE DISTRIBUTION SYSTEM.
- OTHER RELATED WORK TO INSTALL THE TRANSFORMERS, VFD, AND 24" MOTOR ACTUATOR ON THE 24" BUTTERFLY VALVES, CAN BE PERFORMED AFTER THE FLOW OF FINISHED WATER IS RESTORED.
- THE CONTRACTOR SHALL COORDINATE THE COMMISSIONING, TESTING, START-UP AND TRAINING OF THE NEW EQUIPMENT AND CONTROLS WITH THE OWNER. 48-HOURS ADVANCE NOTICE SHALL BE PROVIDED BY THE CONTRACTOR IF ANY ADDITIONAL WORK IS REQUIRED TO MAKE ADJUSTMENTS TO CONTROLS, PERFORM TIE-INS OR CUT-OVER POWER, OR TROUBLESHOOT ISSUES AND MAKE ADJUSTMENTS THAT MAY REQUIRE AN OUTAGE. THE WORK PERFORMED ONLY UPON AUTHORIZATION BY THE OWNER.



ENLARGED PLAN  
SCALE: 1" = 1'-0"



PHOTO OF EXISTING FINISHED WATER HEADER IN PUMP GALLERY

PROPOSED PIPING PLAN AT EL. 1075.00

SCALE: 1/4" = 1'-0"

**BURGESS & NIPLÉ**  
100 WEST ERIE STREET  
PAINESVILLE, OHIO 44077

CITY OF CANTON, OHIO  
WATER DEPARTMENT  
NORTHEAST WATER TREATMENT PLANT  
HIGH SERVICE PUMP #3  
AND VFD UPGRADE

NO.	DESCRIPTION	DATE

JOB NO: PR60961  
 DATE: OCT. 2023  
 DESIGNED BY: CMS  
 DRAWN BY: PJE  
 CHECKED BY: CMS  
 APPROVED BY: CMS

SCALE: AS NOTED

PROPOSED PIPING PLAN

P-3

SHEET: 4 OF 10

POWER LEGEND

- RECEPTACLE OUTLETS - NUMERAL BY THE SIDE OF THE SYMBOL INDICATES CIRCUIT NUMBER
DUPLICATION OUTLET MOUNTED AT +18" OR AS NOTED.
DOUBLE DUPLICATION OUTLET (FOURPLEX) RECEPTACLE MOUNTED AT +18" OR AS NOTED.

RACEWAYS AND CONDUCTORS

- INDICATES HOMERUN FROM EQUIPMENT TO PANELBOARD OR AS NOTED.
CONDUIT TURNING UP
CONDUIT TURNING DOWN
PROPOSED OVERHEAD PRIMARY CABLE

LIGHTING

- LIGHTING FIXTURES - CAPITAL LETTER INDICATES THE FIXTURE TYPE AS SHOWN ON FIXTURE SCHEDULE. NUMERAL INDICATES CIRCUIT NO. AND SMALL LETTER DESIGNATES THE CONTROL SWITCH. EXACT MOUNTING PER SCHEDULE.
CEILING WALL DESCRIPTION
SURFACE OR PENDANT INCANDESCENT, HID OR SIMILAR LAMP FIXTURE.

SWITCHED OUTLET

- SMALL LETTER BY THE SIDE OF SYMBOLS INDICATES THE PARTICULAR SWITCH.
SAMPLE: S1 = SWITCH "1"
S1 SINGLE POLE SWITCH MOUNTED AT +48" OR AS NOTED.
S2 TWO POLE SWITCH MOUNTED AT +48" OR AS NOTED.

ABBREVIATED LIST OF NEMA ENCLOSURE TYPES

- TYPE 1: GENERAL PURPOSE. INDOOR.
TYPE 2: DRIP-PROOF. NONCORROSIVE. INDOOR.
TYPE 3: DUST-TIGHT. RAIN-TIGHT. OUTDOOR.
TYPE 3R: RAINPROOF. OUTDOOR.

PROJECT GENERAL NOTES:

- 1. ALL WORK SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (N.E.C.) LATEST EDITION.
2. COORDINATE ALL ELECTRICAL EQUIPMENT LOCATIONS AND MECHANICAL APURTENANCES WITHIN THE EXISTING CONDITIONS TO PROVIDE ADEQUATE WORKING AND ACCESS PER N.E.C. REQUIREMENTS.

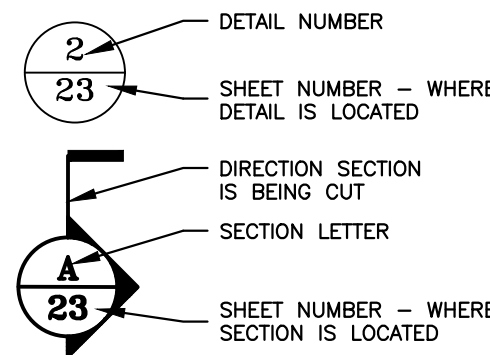
DEMOLITION GENERAL NOTES:

- 1. ANY DEMOLITION INDICATED ON THESE DRAWINGS IS SHOWN IN GENERAL TO INDICATE THE EXTENT OF DEMOLITION AND IS NOT TO BE CONSIDERED AS A RECORD DRAWING OF EXISTING CONDITIONS. ACCORDINGLY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETE DEMOLITION OF ELECTRICAL WORK INDICATED INCLUDING ANY BURIED ITEMS OR EXISTING ITEMS NOT SHOWN ON THESE DRAWINGS.

ABBREVIATIONS

- ACB AIR CIRCUIT BREAKER
ALT ALTERNATE
ALC ALTERNATING CURRENT
AL ALUMINUM
AWG AMERICAN WIRE GAUGE
AMPERE(S)
ATS AUTOMATIC TRANSFER SWITCH
BW BUSBAR

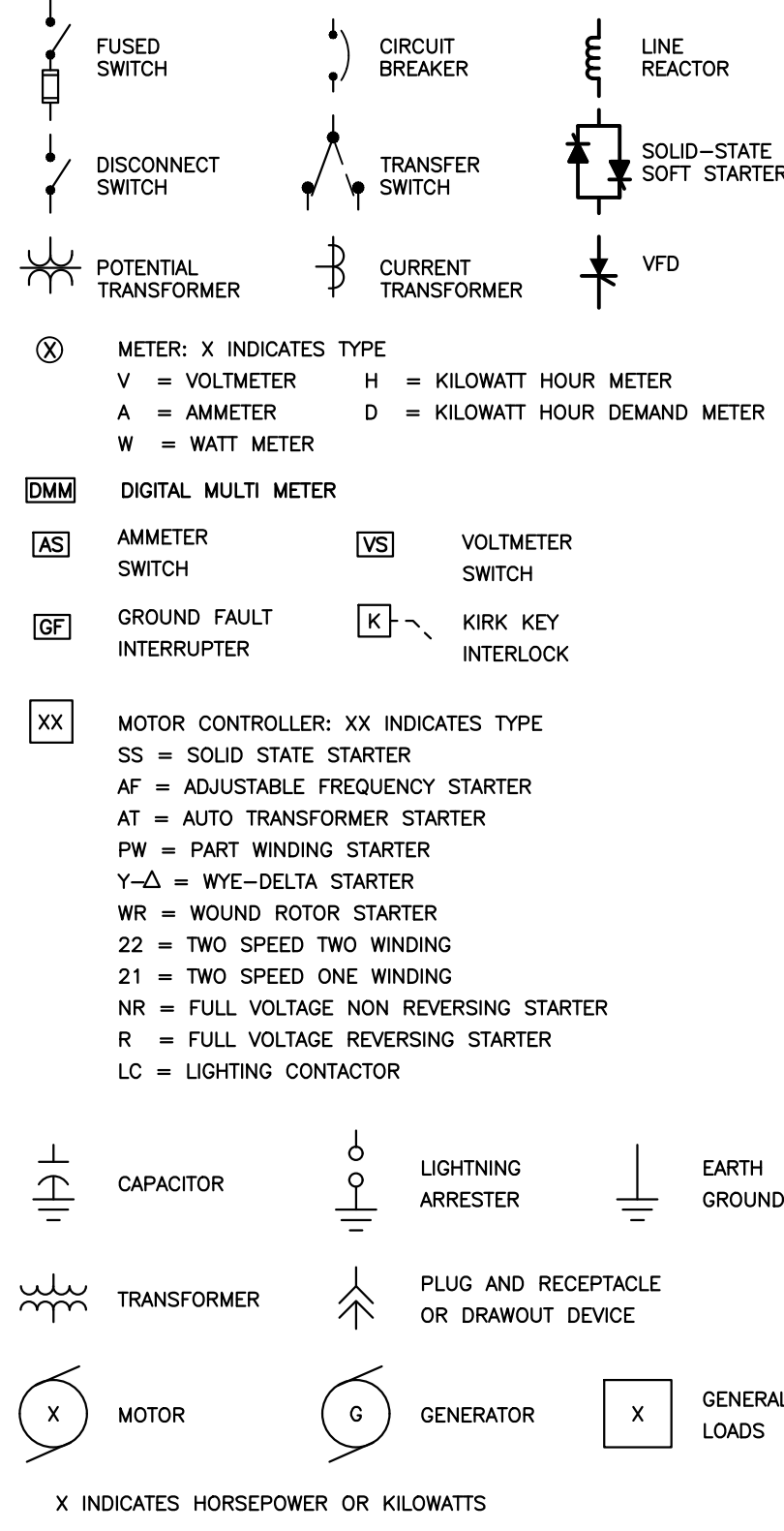
DETAIL & SECTION MARK LEGEND



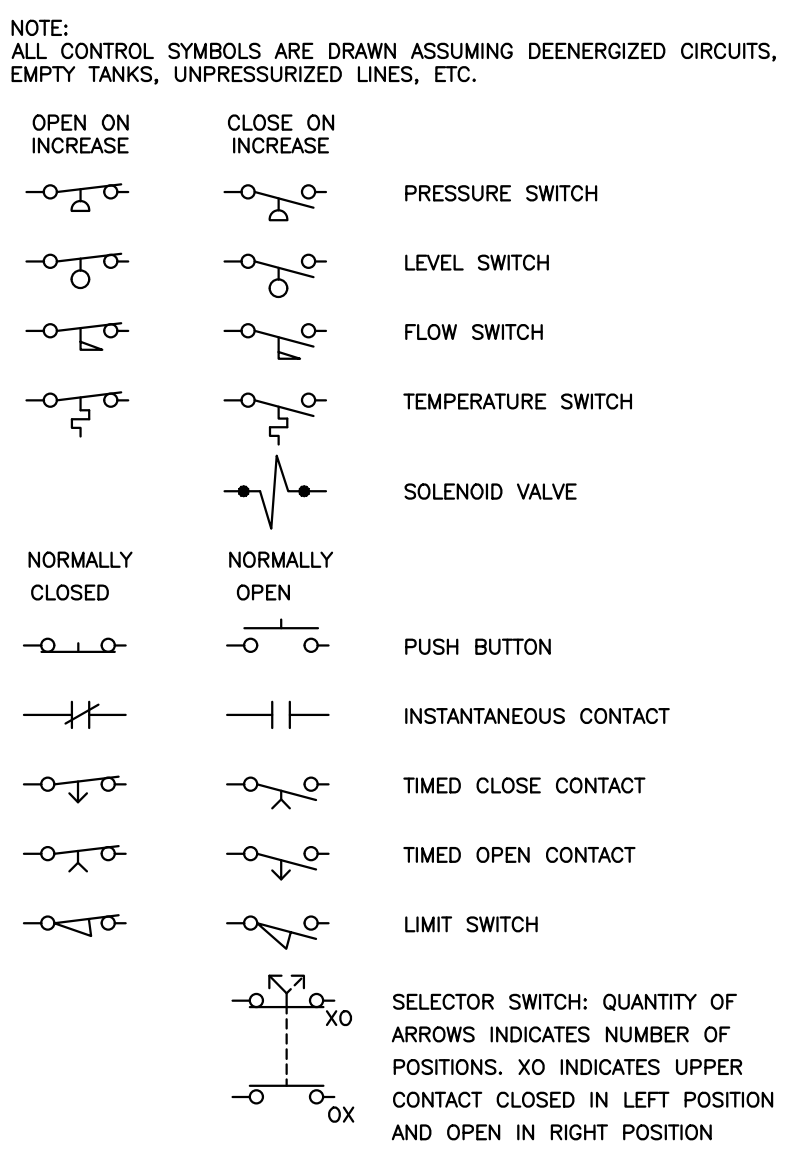
DIRECTION OF NORTH



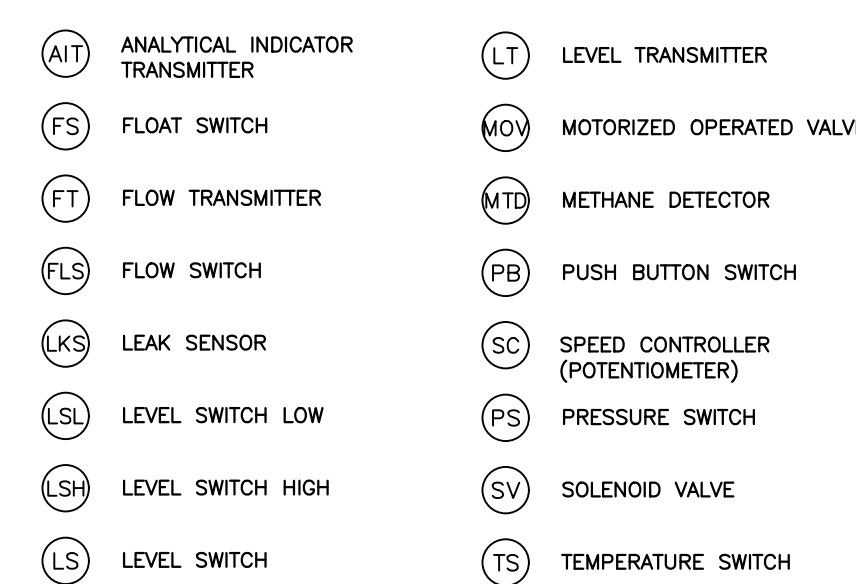
DIAGRAM SYMBOLS



CONTROL DIAGRAM SYMBOLS



INSTRUMENTATION SYMBOLS



INSTRUMENTATION NOTES:

- 1. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY POWER AND SIGNAL WIRING WITH CONDUITS AS SHOWN ON ELECTRICAL AND INSTRUMENTATION DRAWINGS BETWEEN POWER PANELS, PLC'S, CONTROL PANELS, AND FIELD INSTRUMENTS AS REQUIRED.
2. MINIMUM SIZE CONDUIT TO BE 3/4".

INSTRUMENTATION GROUNDING

- 1. SHIELDED CONDUCTORS SHALL HAVE THEIR SHIELD WIRE CONNECTED TO GROUND AT ONE END ONLY.
2. CONTROL CABINETS SHALL BE PROVIDED WITH AN ISOLATED INSTRUMENT GROUND BUS FOR INSTRUMENTATION GROUND WIRE. THIS BUS SHALL BE TIED TO FACILITY GROUND AT A SINGLE POINT (BONDED).

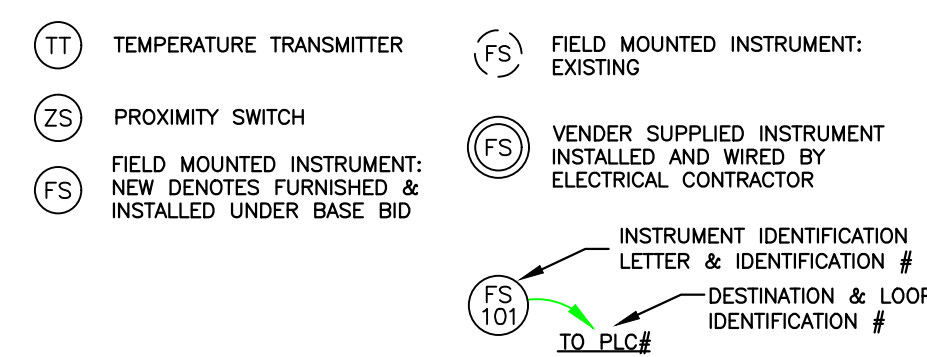
PROCESS SIGNAL SCALING & CALIBRATION

- 1. ALL INSTRUMENTS SHALL BE PROPERLY CALIBRATED BY THE INSTALLING CONTRACTOR. A CALIBRATION STICKER SHALL BE ATTACHED INDICATING CALIBRATION DATE AND THE INITIALS OF THE INDIVIDUAL WHO PERFORMED THE CALIBRATION.
2. ALL PROCESS ANALOG LOOPS SHALL BE PROPERLY CALIBRATED AND SCALED TO THE EXTENT POSSIBLE AND PRACTICAL. ANALOG INSTRUMENTS SHALL BE CALIBRATED TO READ THE ENTIRE OPERATING RANGE FOR THE PARAMETER BEING MONITORED.

INSTRUMENTATION PIPING & MOUNTING

- 1. DIRECT READING INSTRUMENTS SHALL BE MOUNTED AT EYE HEIGHT, ~5 FT ABOVE FINISHED FLOOR, UNLESS PROCESS RESTRAINTS NECESSITATE OTHER MOUNTING ARRANGEMENTS, OR UNLESS OTHERWISE NOTED.
2. INSTRUMENTS SHALL BE SECURELY ANCHORED TO THE STRUCTURES OR MONITORED EQUIPMENT. PROPER MOUNTING HARDWARE SHALL BE UTILIZED. (BOLTS, NUTS, UNISTRUT, ETC.)

INSTRUMENTATION SYMBOLS CONT.



SMR Engineering, PC logo and contact information: 10175 Inlet Point East, Aurora, OH 44202, Tel: 440-725-0264

BURGESS & NIPL logo and address: 100 WEST ERIE STREET PAINESVILLE, OHIO 44077

CITY OF CANTON, OHIO WATER DEPARTMENT NORTHEAST WATER TREATMENT PLANT HIGH SERVICE PUMP #3 AND VFD UPGRADE

Table with columns for NO., DESCRIPTION, DATE, and REVISIONS.

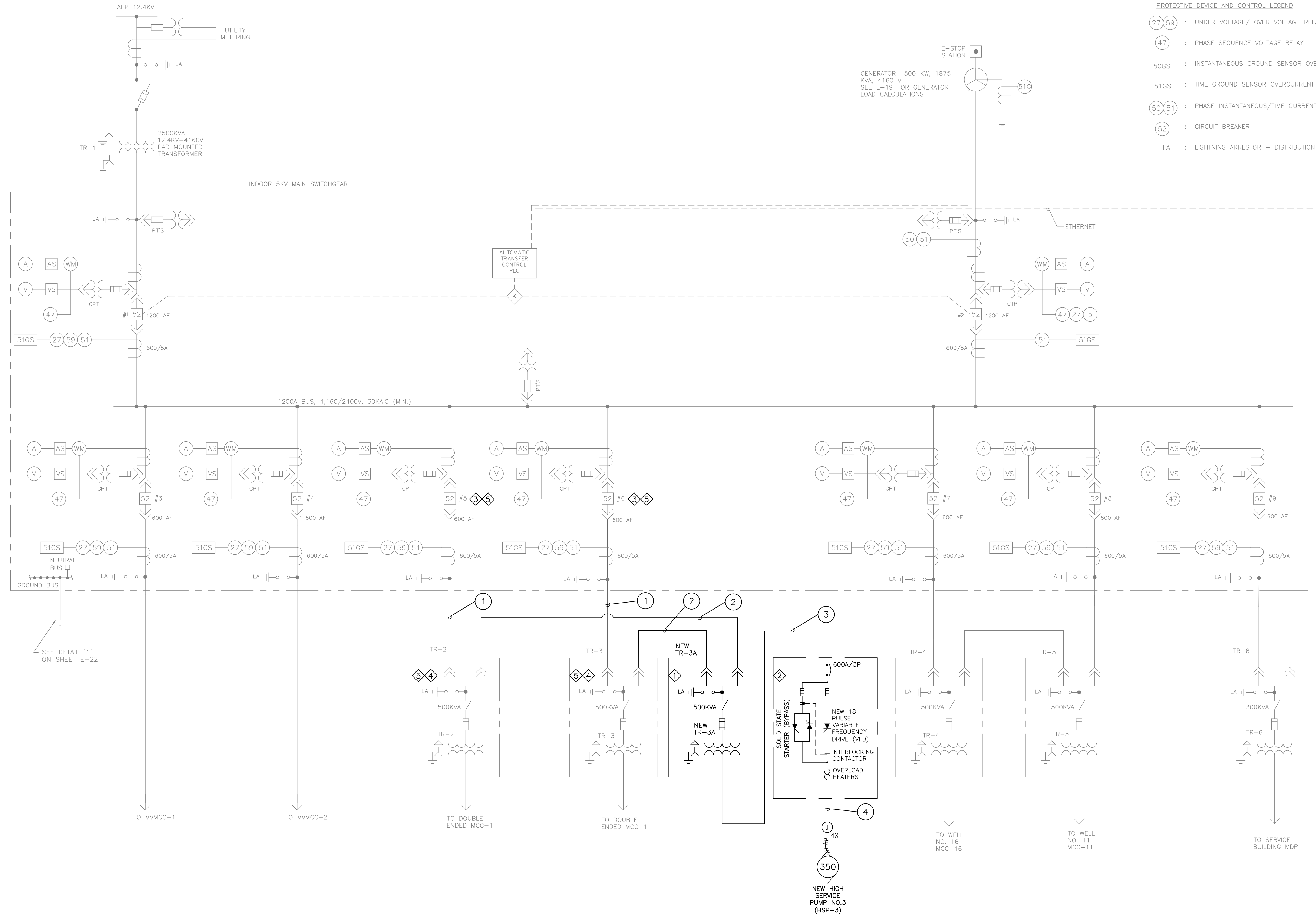
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GENERAL NOTES, SYMBOLS & ABBREVIATIONS

E-1 SHEET: 5 OF 10



C:\Users\GSmigel\Documents\SMR Engineering\Burgess & Niple\Canton, Ohio\Canton Northeast WTP VFD E-2 EXISTING MODIFIED ELECTRICAL ONE-LINE DIAGRAM 5KV SWITCHGEAR.dwg 9/27/2023 3:38:21 PM Gmd Smigel  
 PLOTTED: 10/16/2023 7:55:15 PM



**PROTECTIVE DEVICE AND CONTROL LEGEND**

- (27 59) : UNDER VOLTAGE/ OVER VOLTAGE RELAY
- (47) : PHASE SEQUENCE VOLTAGE RELAY
- 50GS : INSTANTANEOUS GROUND SENSOR OVERCURRENT RELAY
- 51GS : TIME GROUND SENSOR OVERCURRENT RELAY
- (50 51) : PHASE INSTANTANEOUS/TIME CURRENT RELAY
- (52) : CIRCUIT BREAKER
- LA : LIGHTNING ARRESTOR - DISTRIBUTION CLASS

**FEEDER/CONDUIT SCHEDULE**

- 1 EXISTING (1) 5" C. WITH NEW 3 #4/0, 8KV, 1 #2, 600V GRD
- 2 NEW (1) 5" C. WITH NEW 3#4/0, 8KV AND 1 #2, 600V GRD.
- 3 NEW (2) 3" C. WITH NEW 4#350KCMIL, 1#2G, 8#14 EACH.
- 4 NEW (2) 3" C. WITH NEW 3#250KCMIL, 1#2G EACH.

- KEY NOTES:**
- 1 NEW 500KVA, 4,160V-480Y/277V PAD MOUNTED TRANSFORMER TR-3A.
  - 2 NEW VFD WITH SOFT-START BYPASS.
  - 3 RECONFIGURE THE BREAKERS SETTING FOR 175 AMPS CONTINUOUS CURRENT, PROVIDE NEW 5KV CABLE TERMINATIONS ASSEMBLY AS REQUIRED.
  - 4 PROVIDE NEW 5KV CABLE TERMINATIONS ASSEMBLY AS REQUIRED.
  - 5 RETAIN SERVICES OF EATON CORP. FOR ONE 8-HOUR DAY TO PROVIDE SUPERVISIONS & THE REQUIRED 5KV BREAKERS RESETTINGS WORK AS REQUIRED.

**SMR ENGINEERING, PC**  
 Electrical, Instrumentation, & Control Systems Engineering  
 10175 Line Point East, Suite 202  
 Painesville, OH 44064  
 Tel: 440-725-0264  
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**BURGESS & NIPLÉ**  
 100 WEST ERIE STREET  
 PAINESVILLE, OHIO 44077

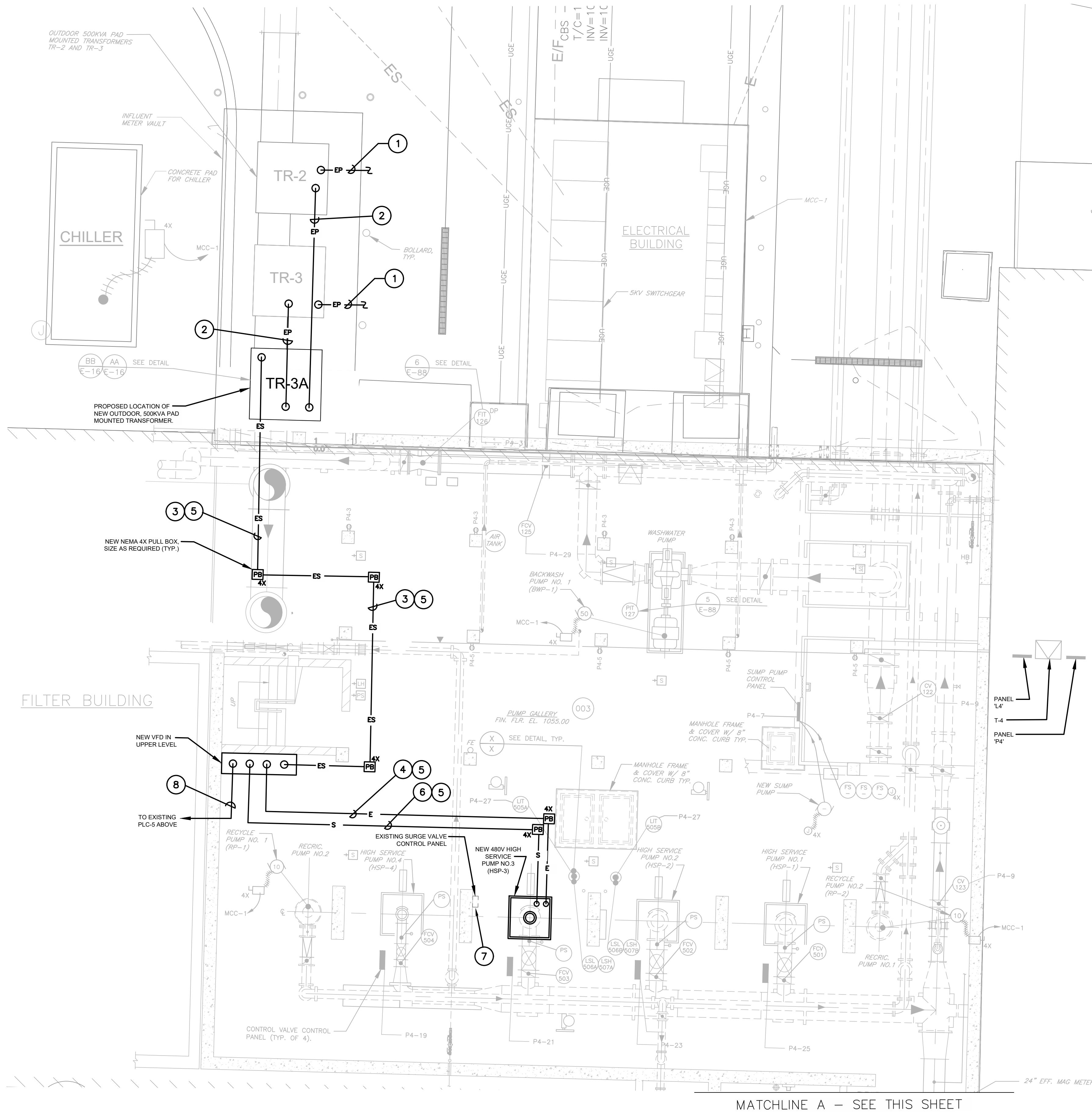
CITY OF CANTON, OHIO  
 WATER DEPARTMENT  
 NORTHEAST WATER TREATMENT PLANT  
 HIGH SERVICE PUMP #3  
 AND VFD UPGRADE

NO.	DESCRIPTION	DATE	REVISIONS

**JOB NO:** PR60961  
**DATE:** AUG. 2023  
**DESIGNED BY:** SMR  
**DRAWN BY:** GMS  
**CHECKED BY:** SMR  
**APPROVED BY:** SMR  
**SCALE:** NONE

EXISTING MODIFIED  
 ELECTRICAL  
 ONE-LINE DIAGRAM  
 5KV SWITCHGEAR

**EXISTING MODIFIED ELECTRICAL ONE-LINE DIAGRAM 5KV SWITCHGEAR**  
 SCALE: NONE



- NEW CONDUIT SCHEDULE:**
- 1 EXISTING (1) 5" C. WITH NEW 3 #4/O, 8KV AND 1#2, 600GRD.
  - 2 NEW (1) 5" C. WITH NEW 3#4/O, 8KV AND 1#2, 600GRD.
  - 3 NEW (2) 3" C. WITH 4#350KCMIL, 1#2G EACH.
  - 4 NEW (2) 3" C. WITH 3#250KCMIL, 1#2G & 8#14 EACH.
  - 5 ROUTE NEW CONDUIT OVERHEAD IN THE BASEMENT AS HIGH AS POSSIBLE. ADDITIONAL PULL BOXES & CONDUIT SWEEPS MIGHT BE REQUIRED DUE TO EXISTING OVERHEAD PIPING & EQUIPMENT.
  - 6 1" C. WITH (3) 3/C #18 SH. PRS. (RTDS) & 3/4" CONDUIT WITH 4#14 (TS) TO NEW VFD.
  - 7 1" C. WITH 14#14 TO NEW VFD IN UPPER LEVEL.
  - 8 1" C. WITH 10#14 & 1" C WITH (4) & 2/C #18 SH. PRS.
  - 9 3/4" C. WITH 3#12, 1#12G TO EXISTING 208/120V PANEL "P4". PROVIDE A 20A/1P BRANCH CIRCUIT BREAKER AS REQUIRED.
  - 10 3/4" C. WITH (2) 2/C #18 SH. PRS. & 3/4" C. WITH 8#14 TO EXISTING PLC-5.
  - 11 3/4" C. WITH 2/C #18 SH. PRS. TO EXISTING PLC-5.

**SMR ENGINEERING, PC**  
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 Tel: 460-725-0264

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**SMR ENGINEERING, PC**

**BURGESS & NIPLE**  
 100 WEST ERIE STREET  
 PAINESVILLE, OHIO 44077

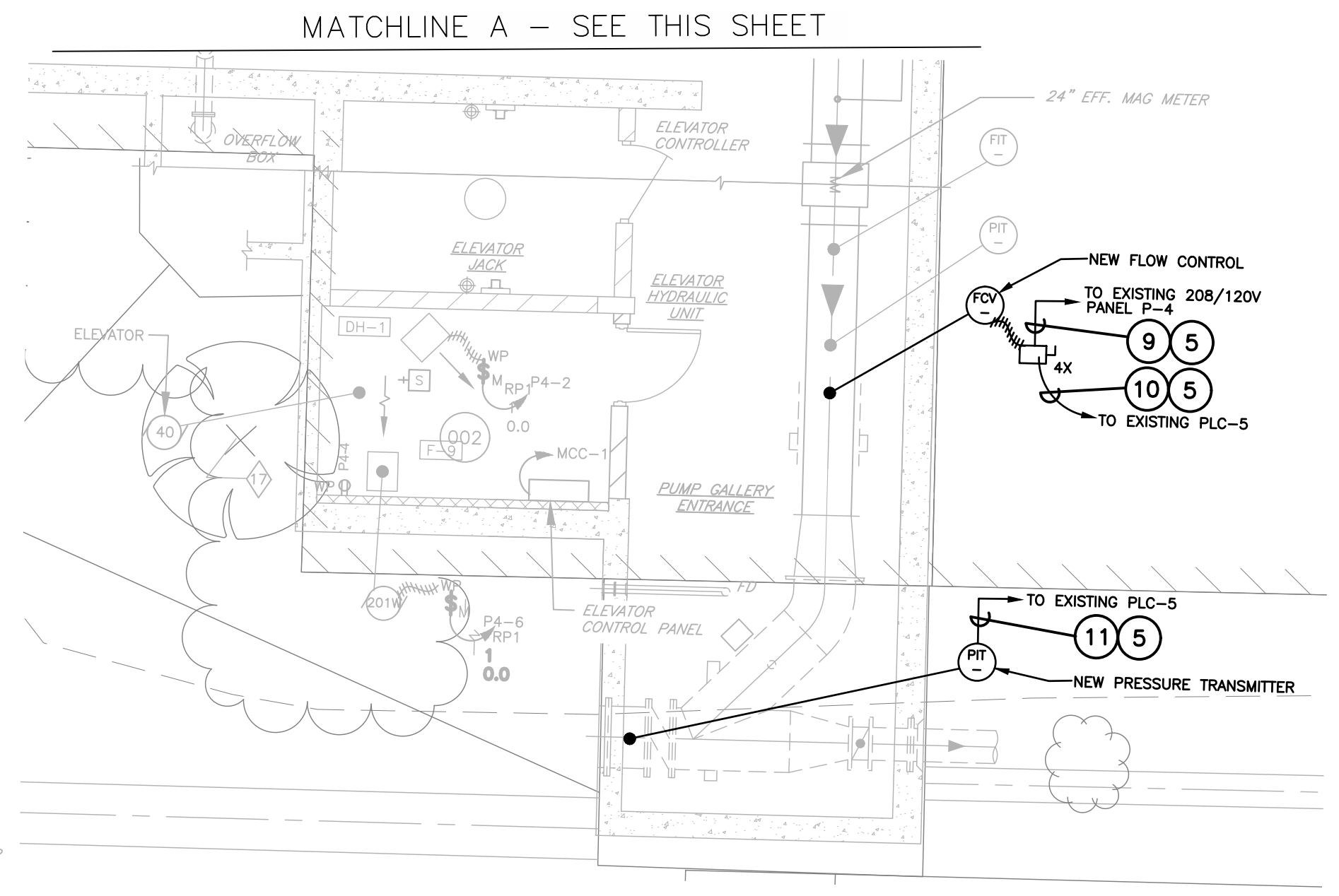
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NO.	DESCRIPTION	DATE

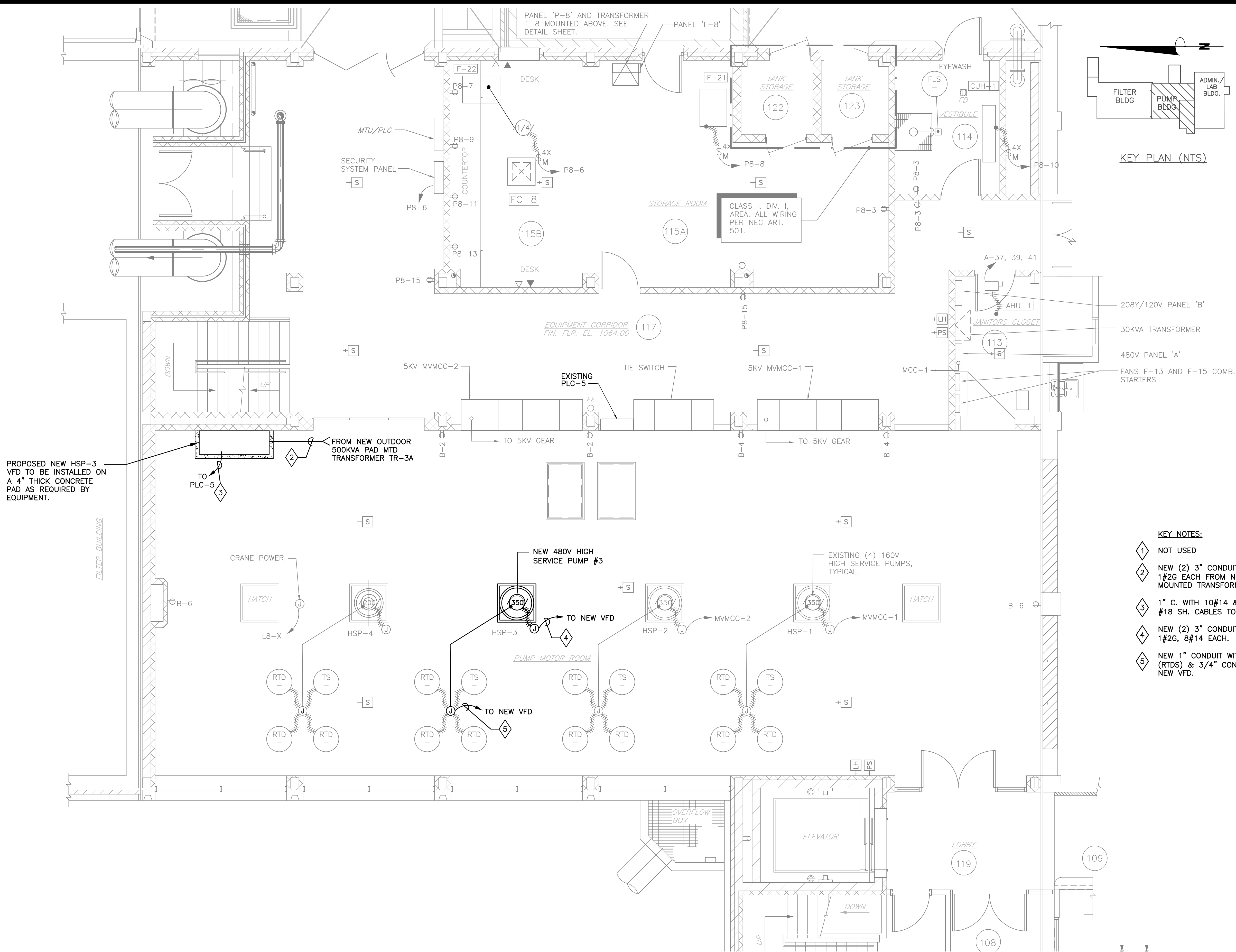
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 DESIGNED BY: SMR  
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 APPROVED BY: SMR  
 SCALE: NONE

ELECTRICAL PUMP BUILDING SITE PLAN

**E-3**  
 SHEET: 7 OF 10



**ELECTRICAL PUMP BUILDING SITE PLAN**  
 SCALE: 1" = 5.5'



PROPOSED NEW HSP-3 VFD TO BE INSTALLED ON A 4" THICK CONCRETE PAD AS REQUIRED BY EQUIPMENT.



**PUMP BUILDING POWER PLAN AT EL. 1073.5**

SCALE: 1/4" = 1'-0"

- KEY NOTES:**
- 1 NOT USED
  - 2 NEW (2) 3" CONDUITS WITH 4#350KCMIL & 1#2G EACH FROM NEW 500KVA OUTDOOR PAD MOUNTED TRANSFORMER.
  - 3 1" C. WITH 10#14 & 1" C. WITH (4) 2/C #18 SH. CABLES TO PLC-5.
  - 4 NEW (2) 3" CONDUITS WITH 3#250KCMIL, 1#2G, 8#14 EACH.
  - 5 NEW 1" CONDUIT WITH (3) 3/C #18 SH. PR. (RTDS) & 3/4" CONDUIT WITH 4#14 (TS) TO NEW VFD.

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 10175 Inlet Point  
 Erie, PA 16512  
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 PAINESVILLE, OHIO 44077

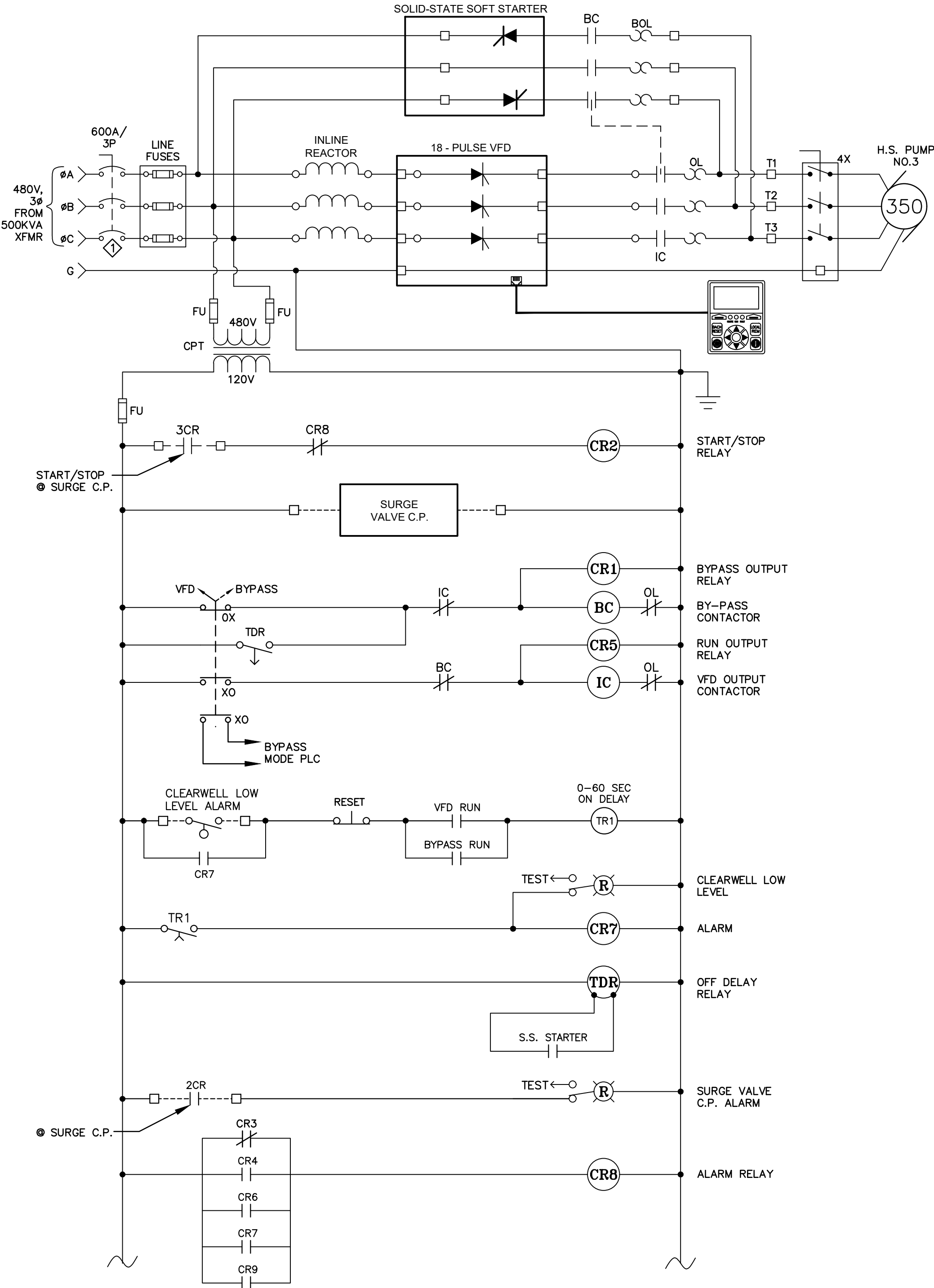
CITY OF CANTON, OHIO  
 WATER DEPARTMENT  
 NORTHEAST WATER TREATMENT PLANT  
 HIGH SERVICE PUMP #3  
 AND VFD UPGRADE

NO.	DESCRIPTION	DATE	REVISIONS

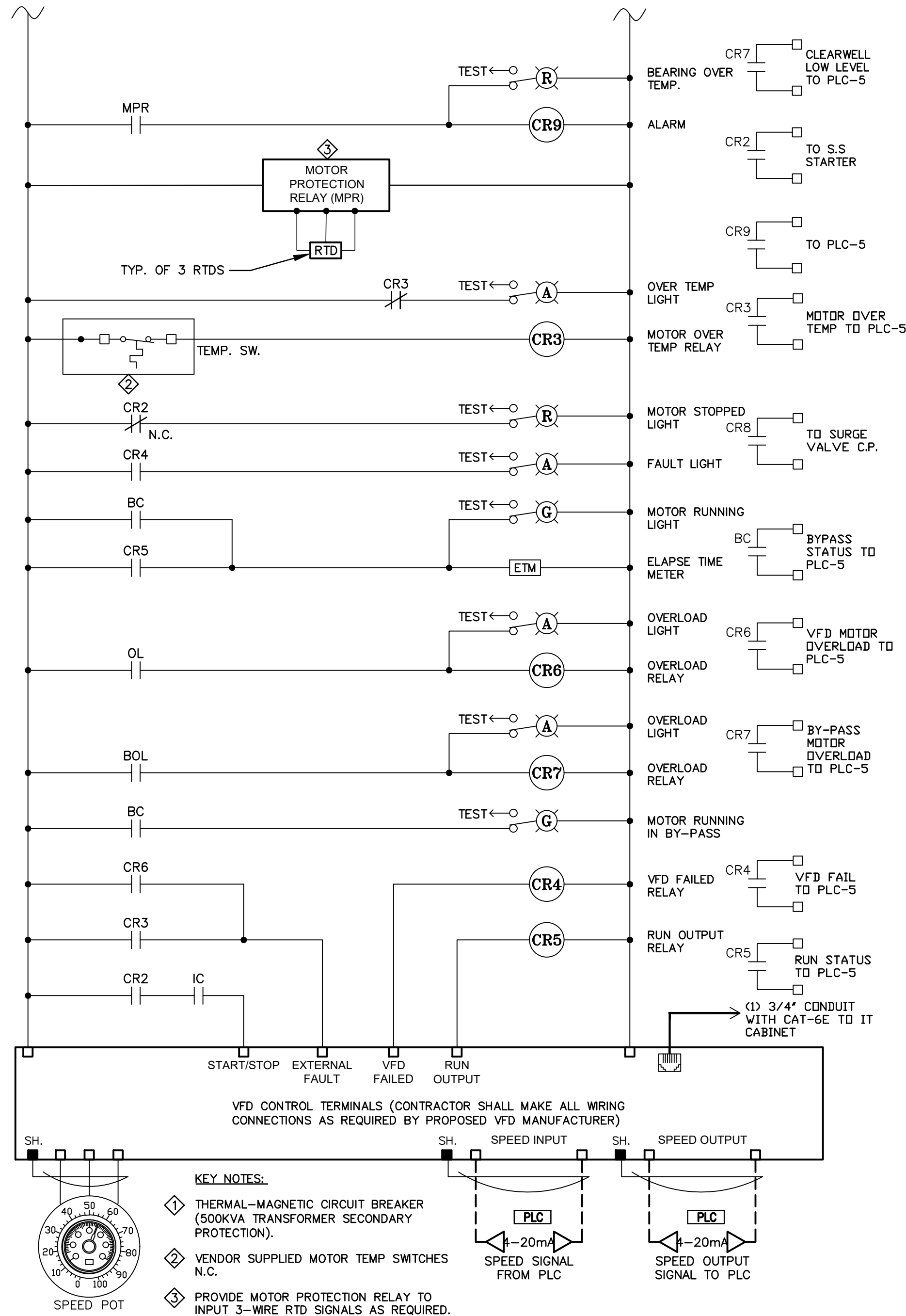
JOB NO:	PR60961
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CHECKED BY:	SMR
APPROVED BY:	SMR
SCALE:	NONE

PUMP BUILDING POWER PLAN AT EL. 1073.5

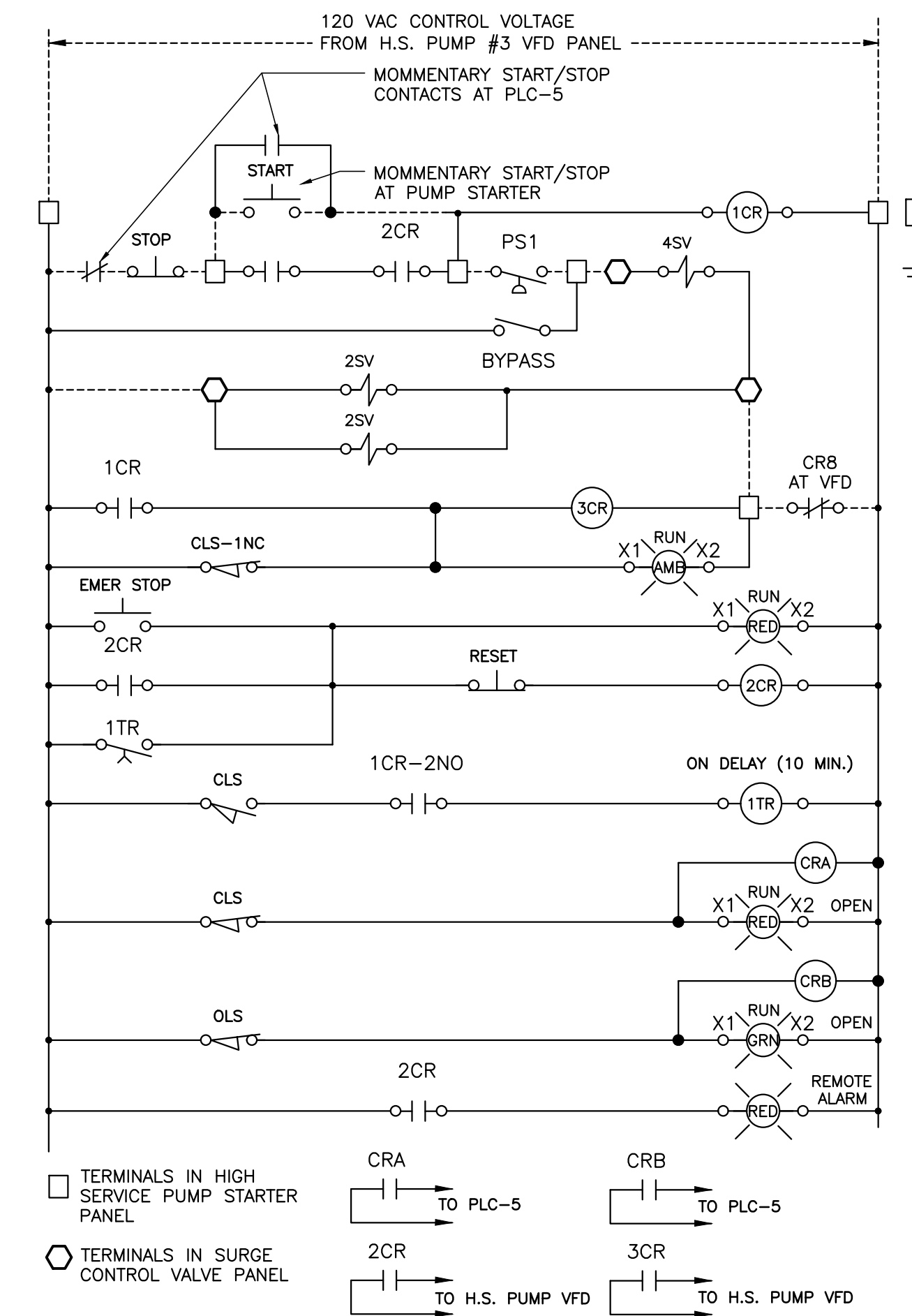
**E-4**



NEW HIGH SERVICE PUMP #3 VFD/SOLID-STATE STARTER WIRING DIAGRAM 1  
E-5  
SCALE: NONE



CONTINUATION - HIGH SERVICE PUMP #3 VFD/SOLID-STATE STARTERS WIRING DIAGRAM 2  
E-5  
SCALE: NONE



EXISTING, MODIFIED SURGE VALVE CONTROL PANEL WIRING DIAGRAM 3  
E-5  
SCALE: NONE

**SMR**  
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& Control Systems Engineering  
10175 Inlet Point  
East Aurora, OH 44202  
Tel: 440-725-0264

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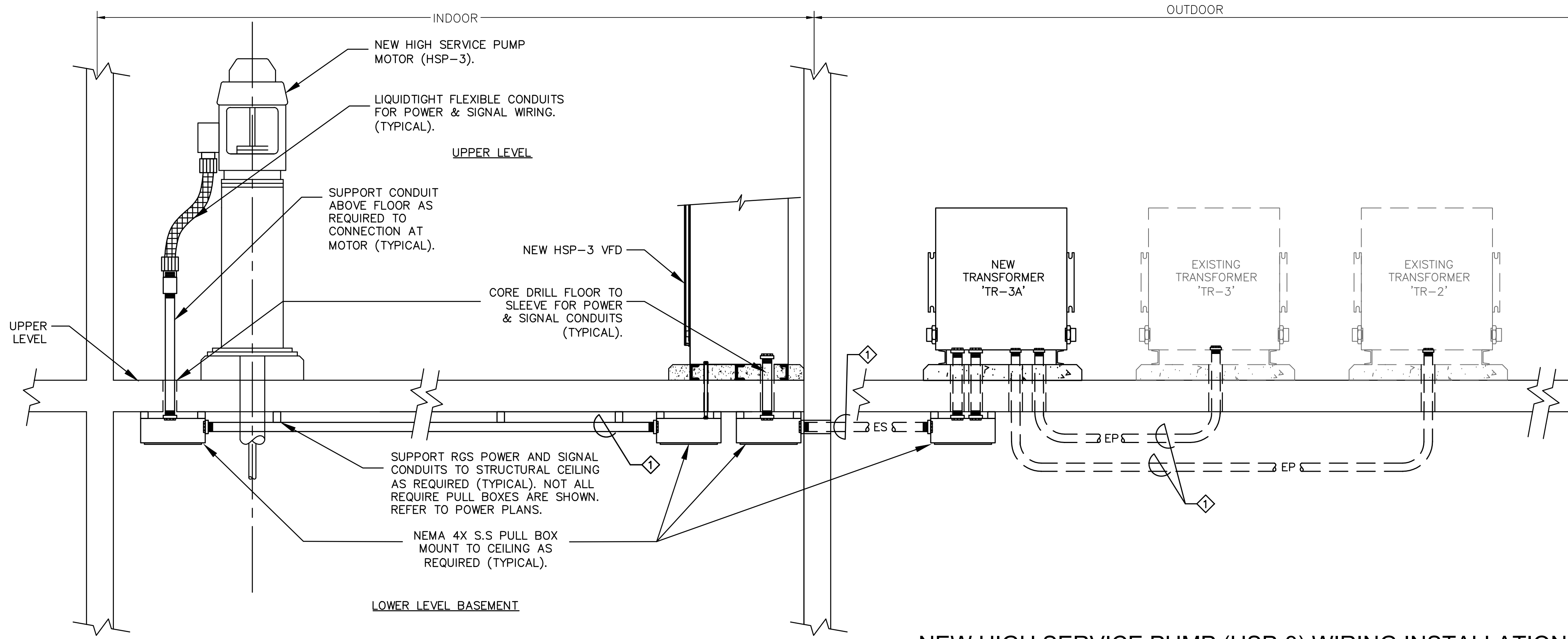
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CITY OF CANTON, OHIO  
WATER DEPARTMENT  
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APPROVED BY: SMR  
SCALE: NONE

WIRING DIAGRAMS  
**E-5**  
SHEET: 9 OF 10



NEW HIGH SERVICE PUMP (HSP-3) WIRING INSTALLATION DETAIL

SCALE: NONE

1  
E-6

KEY NOTES:  
 ◆ NEW WIRING & CONDUITS. SEE ELECTRICAL ONE-LINE DIAGRAMS ON SHEET E-2.

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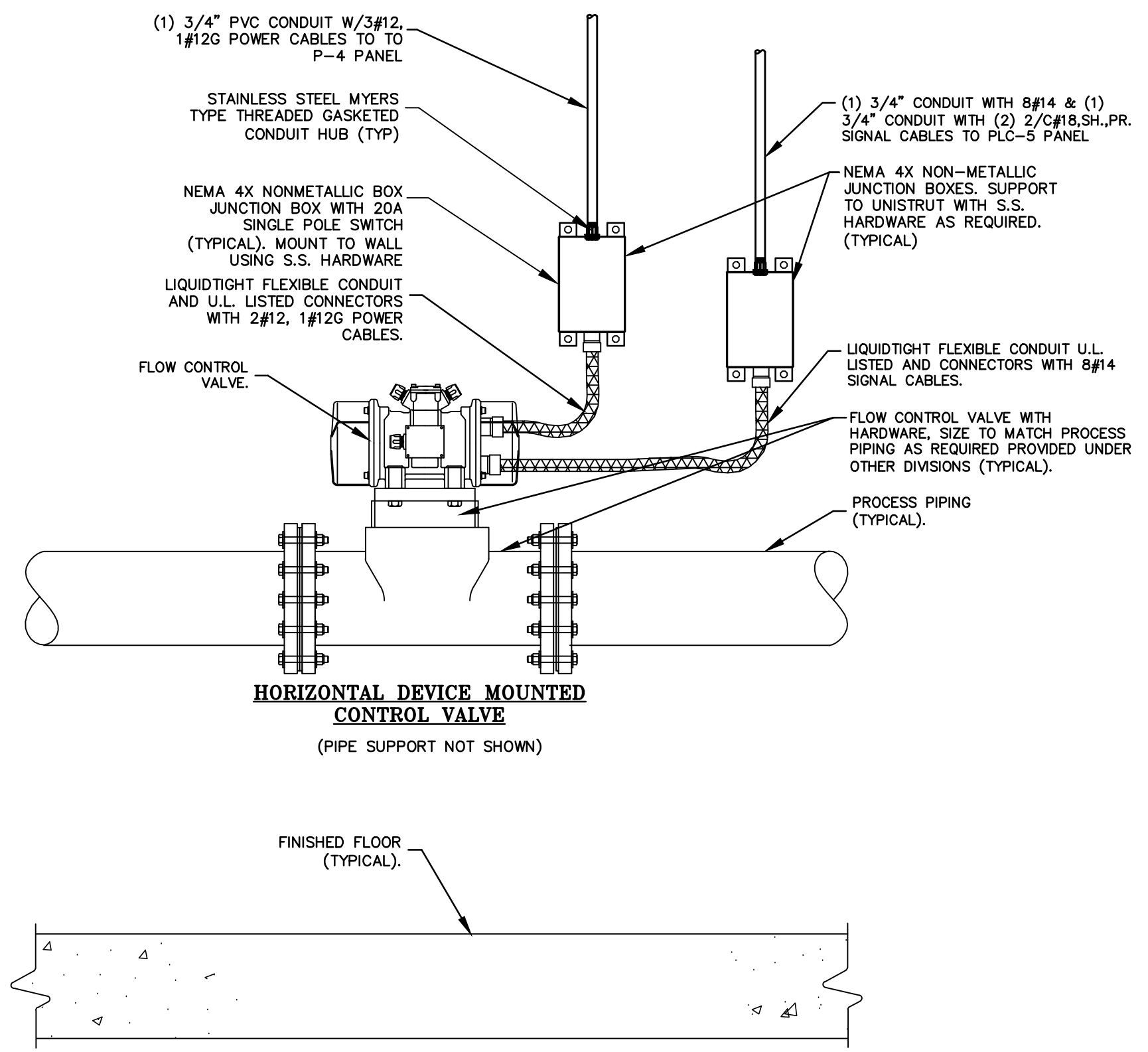
CITY OF CANTON, OHIO  
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 APPROVED BY: SMR  
 SCALE: NONE

ELECTRICAL  
 DETAILS

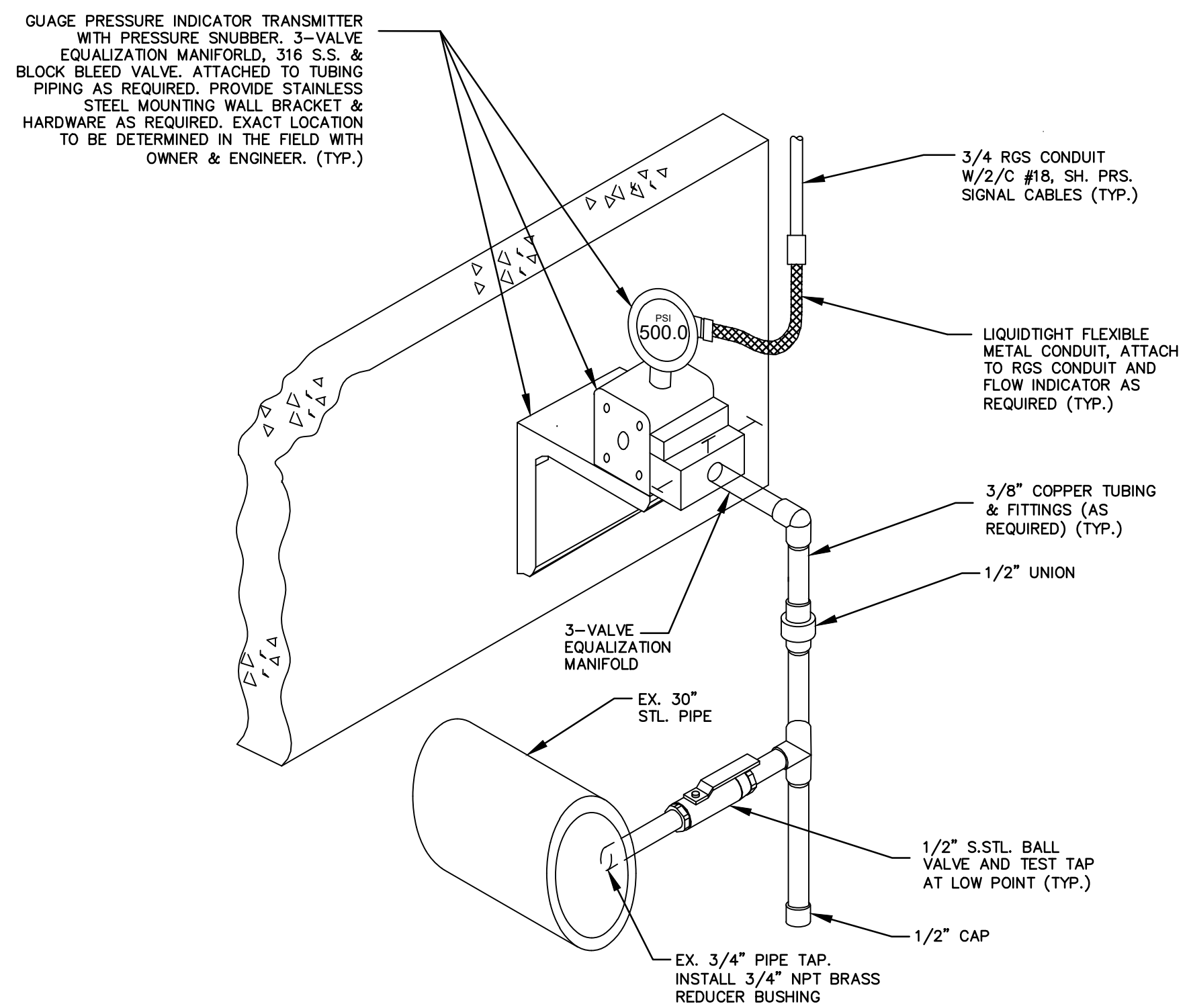
**E-6**  
 SHEET: 10 OF 10



TYP. ELECTRICAL CONNECTION @ FLOW CONTROL VALVE DETAIL (TYP.)

SCALE: NONE

2  
E-6



PRESSURE TRANSMITTER INSTALLATION DETAIL (TYP.)

SCALE: NONE

3  
E-6

## **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 Part 21. *{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 and 38;
- 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 *et seq.*).

## **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:

---

Andrea Perry  
Director of Public Safety  
218 Cleveland Ave S.W., 8<sup>th</sup> floor  
Canton, Ohio 44702  
Phone - 330-438-4303  
Email – [andrea.perry@cantonohio.gov](mailto:andrea.perry@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, 5<sup>th</sup> 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 Statutes," 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 as possible 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 be excluded

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 and low-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:

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Andrea Perry  
Director of Public Safety  
218 Cleveland Avenue, S.W., 8<sup>th</sup> floor  
Canton, Ohio 44702  
Phone – 330-438-4303  
Email - andrea.perry@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 Indian 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 its 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.

**(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.

**Signature and Proposal Pages**

**Signature Page**

**Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades**

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 **Water Department NE Water Treatment Plant High Service Pump #3 & VFD Upgrades** 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.



The City of Canton

**BID SCHEDULE**  
**CITY OF CANTON, OHIO**  
**WATER DEPARTMENT**  
**NORTHEAST WATER TREATMENT PLANT**  
**HIGH SERVICE PUMP #3 AND VFD UPGRADE**

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.

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G = E + F</b>	<b>H = C x G</b>
<b>Item</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Labor Unit Price</b>	<b>Material Unit Price</b>	<b>Total Unit Price (Sum of Labor and Material)</b>	<b>Item Total</b>
1	Bonding	1	LS				
2	Mobilization and Demobilization	1	LS				
3	High Service Pump #3 and VFD Upgrade, Complete less Items 1-2 and 4-8	1	LS				



The City of Canton

Item	Description	Quantity	Unit	Labor Unit Price	Material Unit Price	Total Unit Price (Sum of Labor and Material)	Item Total
4	Low Voltage Motor Controller - Variable Frequency Drive with Solids State Bypass Starter (Equipment Only)	1	EA				
5	Transformer TR-3A (Equipment Only)	1	EA				
6	ALLOWANCE 1 – Pump Service Company	1	LS	-	-	\$95,000.00	\$95,000.00
7	ALLOWANCE 2 – System Integrator	1	LS	-	-	\$35,000.00	\$35,000.00
8	ALLOWANCE 3 - Additional Demolition and Renovation for Process, Electrical, Instrumentation and Control	1	LS	-	-	\$50,000.00	\$50,000.00

**Total of Base Bid Items 1 Through 8.    \$ \_\_\_\_\_**



The City of Canton

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Respectfully submitted:

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Name of Contractor

Address

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Signature

Date

(Seal - if Bid is by a corporation)

Attest \_\_\_\_\_

---

Title

Phone Number

**Base Bid Prices are for Informational Purposes Only.**

**Total Unit Prices will govern.**

END OF SECTION