



THE CITY OF
TALLMADGE
HISTORY MOVING FORWARD

SPECIFICATIONS & PROPOSAL:

Howe Road Park Improvements Phase 2

EROSION CONTROL, GRADING, ASPHALT PAVING, PAVEMENT MARKING,
RESTROOM, DOG PARK

Bids due by: *August 29, 2023 @ 10 a.m.*

Submitted By:

Company Name

Street Address

City

State

Zip

Contact Person

Phone No.

Email Address

David G. Kline, Mayor
Michael Rorar, Director of Public Service

46 North Avenue, Tallmadge, Ohio 44278

Phone 330-633-0854 ▪ Fax 330-633-1359

**City of Tallmadge Department of Public Service
Invitation to Bid**

Sealed proposals will be accepted in the Public Service Department, City of Tallmadge, 46 North Avenue, Tallmadge, Ohio, 44278 until 10:00 a.m. Tuesday, August 29, 2023. (City Hall is open for public access Monday thru Friday from 9:00 a.m. to 3:00 p.m.) Bids being opened immediately thereafter in the Council Chambers of the Municipal Building for:

Howe Road Park Improvements Phase 2

Detailed information, proposal forms and complete specifications and Legal Notice may be obtained from the City of Tallmadge website at [https:// https://www.tallmadge-ohio.org/bids](https://www.tallmadge-ohio.org/bids).

Bidders must use the forms available on the website as no other will be accepted. Proposals must include a price for each item in the Bid Proposal form. Incomplete proposals will be considered informal and will not be considered. Each bid must contain the full name of every person or company participating in the bid.

A bid bond equal to 100% of the bid or a certified check, cashier's check, or a letter of credit in the amount of 10% of the bid to be held as guarantee that in the event a contract is awarded to the bidder, such contract will be duly executed, and its performance properly secured. Should any bid not be awarded or be rejected, such check or bond will be returned to the bidder or bidders after the execution of the contract.

The award of this contract shall be to the lowest and best bidder. The City of Tallmadge reserves the right to reject any or all bids and to accept the bid(s) deemed most beneficial to the City of Tallmadge.

The bidder is responsible for monitoring the above-named website for any official addenda.

Please contact Tina Fiocca in the Public Service Department at tfiocca@tallmadge-ohio.org if you have any questions regarding this bid.

Project Estimate(s):

Base Bid - \$1,006,313.00

Michael Rorar
Director of Public Service
Ordinance 2023-75

Published in the Akron Beacon Journal:

August 13, 2023

Table of Contents and Bidder's Checklist

A complete bid packet will consist of the items listed below.

Complete this checklist to confirm the items required in your bid. Place a checkmark or "X" next to each item that you are submitting to the City of Tallmadge. Failure to submit the listed documents may be cause for rejection of your bid. This checklist should be returned with your bid.

- _____ Cover sheet (Page 1)
- _____ Invitation to Bid (Page 2)
- _____ Table of Contents and Bidder's Checklist (Page 3)
- _____ Section I: Instruction to Bidders (Pages 4 - 5)
- _____ Section II: Bid Forms (Pages 6 - 21)
 - _____ Bid Form List
 - _____ Bid Form 1: Note
 - _____ Bid Form 2: Bid Guaranty and Contract Bond
 - _____ Bid Form 3: Non-Collusion Affidavit
 - _____ Bid Form 4: Statement of Non – Liability for Delinquent Personal Property Taxes
 - _____ Bid Form 5: Statement of Liability for Delinquent Personal Property Taxes
 - _____ Bid Form 6: Certification of Drug Free Workplace
 - _____ Bid Form 7: Certification for Local Preference Certification
 - _____ Bid Form 8: Affidavit in Compliance with Section 3517.13
 - _____ Bid Form 9: Independent Contractor Anti-Bias Disclosure
 - _____ Bid Form 10: Certification of No Personal Interest
 - _____ Bid Form 11: OPERS Independent Worker/ Contractor Acknowledgment Form
 - _____ Bid Form 12: OPERS Form
- _____ Section III: Bid Specifications (Pages 22-27)
- _____ Section IV: Proposal and Signature Pages (Pages 28-29)
- _____ Section V: Alternate Bid Items (Not Used)
- _____ Section VI: Tallmadge Codified Ordinance (Pages 30)
- _____ Section VII: Equipment List (to be submitted with bid) (Page 31)
- _____ Section VIII: Bidder References (to be submitted with bid) (Page 32)
- _____ Section IX: Experience of Management/Supervisory Personnel (Page 33)
- _____ Section X: Prevailing Wage Requirements and Affidavit of Compliance (Pages 34-35)
- _____ Section XI: Technical Specifications (Pages 033000-1 – 334600-4)

SECTION I: INSTRUCTIONS TO BIDDERS

All pages of the Bid Proposal, Specifications and Contract Documents must be intact and included in the bid submittal. Bidders must use the forms provided on the City of Tallmadge website as none other will be accepted.

The City of Tallmadge does encourage bidders to submit all bid forms with their bids.

Submit all bids to the City of Tallmadge Public Service Department, 46 North Avenue, Public Service Department, Tallmadge, Ohio 44278 according to the instructions in the Invitation to Bid posted on the City of Tallmadge's website at <https://www.tallmadge-ohio.org/bids>

Bids should be in a sealed envelope marked with project title and the name and address of bidder and reach the Public Service Department, no later than 10:00 a.m. on Tuesday, August 29, 2023. The Public Service date/time stamp is the official date/time used for the deadline of the submission of bids. The City will disqualify any bid not received on or before 10:00 AM local time on Tuesday, August 29, 2023.

The City reserves the right to waive any informality in any proposal, and to reject any or all bids. The City also reserves the right not to enter into any contract as a result of this invitation for bid.

All addendums will be posted on the City website through Vendor Registry. It is the bidder's responsibility to check this site on a regular basis. The City will not be responsible for any information not viewed by bidders. All bidders should register with www.vendorregistry.com so that the City has all the necessary vendor information.

In reviewing bids to determine who is the lowest and best, the City will take into consideration the extent to which the bid conforms to the bid specifications and the qualifications of the bidder to satisfactorily implement the requirements of the Contract. The City specifically reserves the right to reject any bids for which the bidder fails to demonstrate the ability to provide the service required in a responsible manner.

Any bidder may withdraw his bid, by written request, at any time prior to the deadline set for the bid opening. Please be advised, the City of Tallmadge may impose a \$500.00 penalty to any bidder that withdraws his bid after the bid opening and prior to a contract award(s).

Bid will be awarded to the lowest and best bidder. The City will be the judge of the factors and will make the award accordingly. Should the successful bidder not be able to provide the required services, the City reserves the right to request service from other sources.

Prospective bidders will take notice that the City of Tallmadge, 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 143.06 of the Codified Ordinances of the City of Tallmadge. 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.

After award of the bid, by the City of Tallmadge, the successful bidder will receive an official award notification from the City. The signed contract will represent agreement between the City and the successful bidder (all terms of the bid specifications and any applicable addenda will apply).

The Contractor shall be required to furnish to the City of Tallmadge, evidence showing insurance coverage to be in force throughout the term of the contract. The Contractor shall carry Comprehensive General Liability and Auto Liability Insurance to cover damages for which the contractor may be legally responsible due to bodily injury or property damage. The contractor shall provide to the City of Tallmadge a certificate of insurance showing \$1,000,000.00 Combined Single Limit and \$2,000,000.00 Aggregate Coverage and Workers Compensation Insurance. The City of Tallmadge must be included as an additional insured.

The Contractor covenants to save, defend, hold harmless, and indemnify the City, and all of its officers, departments, agencies, agents, and employees (collectively the "City") from and against any and all claims, losses, damages, injuries, fines, penalties, costs (including court costs and attorney's fees), charges, liability, or exposure, however caused, resulting from, arising out of, or in any way connected with the Contractor's intentional, negligent, or grossly negligent acts or omissions in performance or nonperformance of its work called for by the Contract Documents.

After satisfactory completion of services, the Contractor shall forward invoice(s) to the following address: The City of Tallmadge, Public Service Department, 46 North Ave., Tallmadge, Ohio 44278. **This is a prevailing wage contract.**

SECTION II: BID FORMS

- _____ Bid Form 1: Note
- _____ Bid Form 2: Bid Guaranty and Contract Bond
- _____ Bid Form 3: Non-Collusion Affidavit
- _____ Bid Form 4: Statement of Non – Liability for Delinquent Personal Property Taxes
- _____ Bid Form 5: Statement of Liability for Delinquent Personal Property Taxes
- _____ Bid Form 6: Certification of Drug Free Workplace
- _____ Bid Form 7: Certification for Local Preference
- _____ Bid Form 8: Affidavit in Compliance with Section 3517.13
- _____ Bid Form 9: Independent Contractor Anti-Bias Disclosure
- _____ Bid Form 10: Certification of No Personal Interest
- _____ Bid Form 11: OPERS Independent Worker/ Contractor Acknowledgment Form
- _____ Bid Form 12: OPERS Form

NOTE

The bidder hereby agrees that the Public Service Director has the right to reject any or all bids and to waive informality in any bid and that the bidder shall not dispute the correctness of the quantities used in computing the lowest and best bidder.

(Signature of Officer, Partner or Owner)

(Date)

(Business Address of Bidder)

(Business Phone Number of Bidder)

CERTIFIED CHECK OR BID BOND

Certified check or bid bond in the amount of: _____
_____ on
(State Amount)

(Name of Band or Bonding Company)

deposited herewith.

(Bidder)

(Date)

ALL BIDS NOT IN CONFORMITY WITH THESE PROVISIONS WILL BE REJECTED.

BID GUARANTY/ CONTRACT BOND/ MAINTENANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned _____
_____ as Principal, and
_____ as Sureties, are hereby held and firmly bound unto the

CITY OF TALLMADGE, OHIO

as Obligee in the penal sum of the dollar amount of the Bid submitted by the Principal to the Obligee on the _____ day of _____, 20 _____ to undertake the Project known as:
Howe Road Park Improvements

The penal sum referred to herein shall be the dollar amount of the Principal's Bid to the Obligee, incorporating any additive or deductive alternate proposals 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 amount of the Principal's Bid, including alternates. Alternatively, if the blank is filled in, the amount stated must not be less than the full amount of the Bid including 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.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above name Principal has submitted a Bid for _____ for the City of Tallmadge, Ohio;

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 and the other contract documents; and in the event the Principal pays to the Obligee the difference not to exceed ten percent 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 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 days after the awarding of the Contract enters into a proper Contract in accordance with the Bid and the other contract documents, 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; 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.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that a maintenance guarantee, with good and sufficient surety, in the amount of ten percent (10%) of the amount of the performance guarantee for a period of two (2) years from and after the date of completion and acceptance by the Owner, replace any and all defects arising in the Work, whether resulting from defective materials or defective workmanship, after such period this obligation shall be null and void; otherwise it will remain in full force and effect.

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 Drawings or Specifications therefor shall in any wise affect the obligations of said Surety on its Bond.

IN WITNESS WHEREOF, we have hereunto set our hands and seal this _____ day of _____, 20 _____.

_____ Principal

By _____

_____ Surety

By _____

Address _____

Phone No. _____

(SEAL)

IMPORTANT - Surety companies executing Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

NON-COLLUSION AFFIDAVIT

STATE OF _____)
) SS.
COUNTY OF _____)

Being duly sworn, do depose and say:

that _____
(Insert names of all persons, firms or corporations interested in the bid.)

its agent, officers or employees have not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal; and also, that no member of the Council, head of any Department or bureau, or employee therein, or any officer of the City of Tallmadge is directly or indirectly interested therein.

(Signature)

(Title)

Sworn to and subscribed before me this _____ day of _____, 20____

Notary Public in and for the

COUNTY OF _____, STATE OF _____

My commission expires _____, 20 _____

THIS AFFIDAVIT MUST BE EXECUTED FOR THE APPLICATION TO BE CONSIDERED.

**STATEMENT OF NON-LIABILITY
FOR DELINQUENT PERSONAL PROPERTY TAXES***

STATE OF OHIO)
)SS:
COUNTY OF _____)

_____, being first duly sworn, says that
(See Note Below)

at the time of the submission of said bid said affiant was not charged with delinquent personal property taxes on the general tax list of personal property of

_____ and _____
(County) (State)

(See note below)

Sworn to and subscribed before me this _____ day of _____, 20 _____

Notary Public in and for the

COUNTY OF _____ STATE _____

My Commission expires: _____

Note:

Where an individual has submitted a bid, the name of the individual should appear here. Where an individual signs for a partnership, the name of the partner signing for the partnership should appear together with the name of the partnership. Where a corporation has submitted a bid, the name of the officer, his position, and the name of the corporation should appear.

***Complete either Statement of Non-Liability or Statement of Liability, but not both.**

CERTIFICATION OF
DRUG FREE WORKPLACE

BIDDER'S NAME: _____

ADDRESS:

CITY, STATE:

Project:

CERTIFICATION

The undersigned, being a duly authorized agent of the Bidder does certify that the following facts are true:

1. Bidder has published and provided to employees notice that the manufacture, use, possession, or distribution of drugs in the workplace is prohibited, as well as a specification of the disciplinary action that may be taken against employees who violate that prohibition.
2. It is the policy of the Bidder that any employee convicted of violating a criminal drug statute occurring in the workplace is required to notify the employer of said conviction within five (5) days after such conviction.
3. Bidder has published notice specifying the sanctions for or requiring satisfactory participation in a drug abuse assistance or rehabilitation program by an employee convicted of violating a criminal drug statute occurring in the workplace.
4. Bidder has implemented a program for the distribution of information on drug abuse awareness and the availability of counseling and referral services.

I further certify and understand that the City of Tallmadge, pursuant to Ordinance 142-1994, can enter into a contract resulting from the competitive bidding process only with those Bidders who provide a drug free workplace by meeting the above requirements.

DATE: _____

Signature: _____

Title:

**CERTIFICATION FOR
LOCAL PREFERENCE**

The undersigned bidder does hereby certify that his principal place of business is within the corporate limits of the City of Tallmadge, Ohio or within the Brimfield / Tallmadge JEDD Area and that he qualifies as a **"local business"** by complying with the following policy as established by Ord. 126-97 Section 143.06:

Local Preference Policy

A. DEFINITIONS:

1. "Business" means a domestic corporation, sole proprietorship, partnership, or joint venture whose principal place of business is located in Tallmadge, Ohio or is located within the area designated as a Joint Economic Development District as established by the City of Tallmadge and the Township of Brimfield. If one party to joint venture has its principal place of business in Tallmadge, Ohio, or is located within the Joint Economic Development District, the joint venture shall be considered as having its principal place of business in Tallmadge. No business as defined herein shall benefit from the local preference policy unless it is participating in the JEDD by withholding and paying City income tax.

2. "Bidder" means the respondent to invitations to bid and/or to requests for proposals.

B. Bidders having established their principal place of business in Tallmadge, Ohio for two successive calendar years immediately preceding the bid opening date or proposal date, may be preferred as lowest if their bid does not exceed the lowest bid by more than 3%, not to exceed ten thousand dollars (\$10,000) of the apparent low bid.

C. To qualify for local preference bidders shall include the following on their bid or proposal documents:

1. Certification that "The bidder of offer hereby certifies that its principal place of business is in Tallmadge, Ohio and has been for at least two successive years immediately preceding the opening date herein".
2. Location of principal place of business.
3. Date of business establishment
4. If the bid is for a City vehicle or motor vehicle or accessory, the bidder's price shall be the same as or lower than the State Purchasing Program price.

D. Each bidder shall have only one principal place of business.

E. Local preference may be applied as provided herein where prohibited by state or federal law.

F. Local preference may be applied in considering the lowest bid and shall not waive or nullify evaluation of bidders which are responsive and responsible or lowest and best.

G. In determining the qualifications of bidders for supplies, commodities, materials, equipment, furnishings or general services as lowest responsive and responsible or lowest and best bidder, the Board of Control shall exercise a preference of local bidders as provided for herein. The local preference shall apply to contracts for the building, repair or renovation of public buildings or improvements

BIDDER'S NAME _____ DATE BUSINESS ESTABLISHED _____

Location of principal place of business _____

Successive years at this location immediately prior to bid opening date: _____

DATED _____ Signed _____

AFFIDAVIT IN COMPLIANCE WITH SECTION 3517.13

STATE OF OHIO
COUNTY OF _____ ss:

Personally, appeared before me the undersigned, a bidder, a representative of a bidder, a contractor or vendor on behalf of

_____ for a contract for _____
(Name of Business) (Type of Product or Service)

to be let by the City of Tallmadge, who, being duly cautioned and sworn, makes the following statement with respect to prohibited activities constituting a conflict of interest or other violations under R.C. Section 3517.13, and further states that the undersigned has the authority to make the following representation on behalf of the entity if the undersigned as an individual is not the bidder himself or herself:

1. On behalf of the corporation, business trust, estate, individual business owner, partner or owner of partnership or other unincorporated business, shareholder of an association, that all of the following persons, where applicable, are in compliance with R.C. 3517.13.
 - a. each owner of more than twenty percent of a corporation;
 - b. each individual, partnership or other unincorporated business, association, including without limitation, professional associations;
 - c. each shareholder of an association, administrator or executor of any estate and trustee of any trust, or political action committee associated with any of the foregoing;
 - d. each spouse of the above;
 - e. each child seven years of age to seventeen years of age of any of the above;
 - f. any combination of the above.

2. The undersigned further certifies that if awarded a contract as a result of competitive bidding, or request for proposals, he, she or it shall not once the contract is awarded and extending until one year following the conclusion of the contract, make as an individual, one or more campaign contributions totaling in excess of \$1,000 or collectively, contributions totaling in excess of \$2,000 (over a two year period), to the holder of the public office having ultimate responsibility for the award of the contract or to the public officer's campaign committee, including individuals or groups of individuals specified in paragraph 1, above.

Signature _____

Title _____

Sworn to before me, a notary public, and subscribed in my presence this ____ day of _____ 20____.

Notary Public _____

My Commission Expires _____

CITY OF TALLMADGE
INDEPENDENT CONTRACTOR ANTI-BIAS DISCLOSURE

1. To the best of your knowledge, do you have any prior relationship(s) with any employee, elected official, or non-elected official of the City of Tallmadge?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

2. If you answered yes to question number 1, Please check the appropriate box(es) that describe that relationship(s)

<input type="checkbox"/>	Spouse
<input type="checkbox"/>	Child whether dependent or independent
<input type="checkbox"/>	Parent
<input type="checkbox"/>	Grandparent
<input type="checkbox"/>	Sibling
<input type="checkbox"/>	Aunt/Uncle
<input type="checkbox"/>	In-law
<input type="checkbox"/>	Step-child
<input type="checkbox"/>	Step-parent
<input type="checkbox"/>	Step-grandparent
<input type="checkbox"/>	Step-sibling
<input type="checkbox"/>	Step-aunt/Step-Uncle
<input type="checkbox"/>	Any other person related by blood or marriage and residing in the same household
<input type="checkbox"/>	Prior business relationship or business associate
<input type="checkbox"/>	Friend
<input type="checkbox"/>	Other significant relationship

1. If you answered Other significant relationship in question number 2, please explain below:

2. Please provide below the name(s) of any and all employees of the City of Tallmadge with whom you have any of the above relationships:

I declare (or certify, verify, or state) under penalty of perjury that the foregoing is true and correct.

Print Name

Signature

Date

CITY OF TALLMADGE
CERTIFICATION OF NO PERSONAL INTEREST

Under penalty of perjury, I hereby certify that:

1. I am not a family member of any public official or public servant of the City of Tallmadge, unless otherwise disclosed in writing to all officers and elected officials of the city.

2. I am not a business associate of any public official or public servant of the City of Tallmadge unless otherwise disclosed in writing to all officers and elected officials of the city.

3. No officer, employee or assignee of the undersigned contractor is a family member or a business associate of the City of Tallmadge and has an ownership interest greater than 5% in the contractor's organization.

4. No owner, officer, employee, or agent of contractor's organization gave, offered or promised anything of value, including future benefits, to a public servant or public official of the City of Tallmadge, other than the consideration expressly provided for in the contract.

DATE: _____

CONTRACTOR:

Name of Organization

Signature

Title

OPERS Independent Worker/Contractor Acknowledgment Form Questionnaire

Please answer the questions below to determine if you will be required to complete the attached OPERS Independent Worker/Contractor Acknowledgment Form.

Question 1:

Are you a sole proprietor/independent contractor?

Yes. You are required to complete the attached OPERS Independent Worker/Contractor Acknowledgment Form. If you have less than 5 employees, each employee is also required to complete the form.

No. Please go to Question 2.

Question 2:

Are you a business entity with less than 5 employees?

Yes. You and each of your employees are required to complete the attached OPERS Independent Worker/Contractor Acknowledgment Form.

No. Please sign the statement below.

I have answered the above questions accurately and truthfully. Based on those answers, I will not be completing the OPERS Independent Worker/Contractor Acknowledgment Form.

Signature

Title

Printed Name

STEP 3: Acknowledgment

The public employer identified in Step 2 has identified you as an independent contractor or another classification other than a public employee. Ohio law requires that you acknowledge in writing that you have been informed that the public employer identified in Step 2 has classified you as an independent contractor or another classification other than a public employee for the services described in Step 2 and that you have been advised that contributions to OPERS will not be made on your behalf for these services.

If you disagree with the public employer's classification, you may contact OPERS to request a determination as to whether you are a public employee eligible for OPERS contributions for these services. Ohio law provides that a request for a determination must be made within five years after you begin providing personal services to the public employer, unless you are able to demonstrate through medical records to the Board's satisfaction that at the time the five-year period ended, you were physically or mentally incapacitated and unable to request a determination.

By signing this form, you are acknowledging that the public employer for whom you are providing personal services has informed you that you have been classified as an independent contractor or another classification other than a public employee and that no contributions will be remitted to OPERS for the personal services you provide to the public employer. This acknowledgment will remain valid as long as you continue to provide the same services to the same employer with no break in service regardless of whether the initial contract period is extended by any additional agreement of the parties. You also acknowledge that you understand you have the right to request a determination of your eligibility for OPERS membership if you disagree with the public employer's classification.

This form must be retained by the public employer and a copy sent to OPERS. The public employer's failure to retain this acknowledgment may extend your right to request a determination beyond the five years referenced above.

Signature _____ Today's Date ____/____/____
Do not print or type name

SECTION III: BID SPECIFICATIONS

A. SCOPE OF WORK

1. The city is seeking a qualified contractor to perform earthwork, asphalt paving services, fencing, building construction, utilities, and related work. The scope of work is to provide all supervision, labor, tools, equipment, and services required to perform earthwork and construction work as specified herein. Contractor shall furnish all necessary supervision, labor, equipment, tools, and transportation, and other resources for excavation, installation and hauling for all park improvement services.
2. All construction of any project shall be in conformance with City of Tallmadge's Codified Ordinances, City Development Standards and the Ohio Revised Code.
3. The following list of items shall be included in the respective bid item cost with no additional payment to be made:

mobilization	pavement protection	asphalt paving
traffic control	concrete paving	chain link fencing/ gates
building construction	compaction	site utilities
excavation	clearing & grubbing	lawn restoration
dog drinking fountains	electric service	

4. The following work shall consist of furnishing all materials, equipment and labor necessary to complete the required items in accordance with the latest edition of the State of Ohio, Department of Transportation, Construction and Material Specifications (ODOT CMS) and the City of Tallmadge Specifications stated herein. The various subsections of the ODOT CMS referenced items shall apply and are hereby considered part of these specifications by reference. All traffic control and maintenance of traffic shall be the responsibility of the contractor. The following sections highlight the general requirements, and are also in addition to, the ODOT CMS.
5. The project shall be fully complete within 220 consecutive days after Notice to Proceed. **The contractor shall notify the Tallmadge inspector at least one hour in advance of any cancellation of work or schedule change.**
6. Inspection - All work performed by the contractor will be subject to inspection by the City of Tallmadge Street and or Service Department and payment will be withheld for any work not complying with the above referenced specs until the deficiencies are corrected. Deficiencies shall be corrected at the sole expense of the contractor.
7. Testing – A minimum of two concrete asphalt samples must be taken for the roadway. One sample must include the intermediate course, and another sample must be on top course. Any road location that exceeds 700 tons must receive additional test(s). On new construction projects, an additional sample of the base course must also be completed. The test must be

completed by a certified testing company. Each sample must have the address, date, temperature, and weather conditions of the time of when the sample was completed. Testing must include a copy of the mix design. The asphalt must meet the requirements of the submitted and approved JMF. Additionally, not less than sixty percent (60%) by weight of crushed gravel shall consist of pieces having two or more faces being freshly fractured.

8. Contractor shall remove all grindings as well as all spoils and debris from the job site unless directed otherwise by the Street Superintendent. Contractor shall handle such material in a manner consistent with all applicable laws and regulations, and shall take care to avoid obstructing roads, sidewalks, and lawns. Contractor shall be responsible for all parts of the work area and the removal of all debris and surplus material, to leave the area in as good a condition as when the work commenced.
9. Lawn and yard restoration shall occur after construction is complete of all disturbed lawn areas, including adjacent cut and fill areas. The contractor shall seed, mulch and fertilize all disturbed areas, using four (4) inches of topsoil. All landscaping shall be repaired according to ODOT CMS. Restored areas shall be repaired and reseeded as often as necessary to produce a close stand of weed free grass.
10. Surface restoration - all areas disturbed by construction operations shall be restored to their original condition as determined by the city or its agent. All streets, walks and other improved surfaces disturbed by construction operations shall be replaced to uniform lines and grades established by the city. Restoration shall follow the construction in a timely fashion to minimize inconvenience to the property owners and the general public.
11. The Contractor shall protect the work until it is accepted by the city. Any part of the completed work that is damaged prior to acceptance by the city shall be replaced at the contractor's expense.

B. EQUIPMENT AND PERSONNEL SPECIFICATION

Equipment, tools, and personnel to be supplied by the contractor include:

1. The contractor will supply the necessary equipment to fulfill the job such as planer, pavers, trucks, dozers etc.
2. It shall be the sole responsibility of the Contractor(s) performing services for this contract to safeguard their own materials, tools and equipment. The City of Tallmadge shall not assume any responsibility for any damaged materials, tools or equipment.
3. Adequate barricades shall be erected and maintained around all areas where equipment and materials are stored and used.

C. SAFETY AND LIABILITY

1. Contractor must contact Ohio Utilities Protection Services to have utilities marked before the start of the project. Call 811
2. Contractor, its agents, successors and assigns shall comply with all rules of the Summit County Health Department and City and all applicable Ohio Department of Health orders and CDC Guidelines.
3. Contractor is responsible to provide a safe workplace and to comply with OSHA and other federal, state or local health and safety regulations.

4. Contractor must follow the Ohio Manual of Uniform Traffic Control Devices (OMUTCD).
http://www.dot.state.oh.us/Divisions/Engineering/Roadway/DesignStandards/traffic/OhioMUTCD/Pages/OMUTCD2012_current_default.aspx
5. Contractor shall attest in writing with the submission of the bid that all equipment utilized during this contract is in good and serviceable condition.
6. Contractor shall assume the entire responsibility and liability for all damages or injuries of any kind or nature whatsoever to all persons, whether its employees or otherwise, and to all property growing out of or resulting from the execution of the work provided for in this contract or occurring in connection therewith. Contractor agrees to defend, indemnify, and hold harmless the City of Tallmadge, its agents, employees, and insurers from and against any and all losses and expenses, including court costs and attorney's fees, damages or injuries growing out of or resulting from or occurring in connection with the execution of the work herein provided for; provide, however, that Contractor will not be held liable for loss of life or injury or damage to person or property due to the sole negligence of the City, its agents, or its employees.
7. If any damage is done to the property of others by Contractor, its employees, or agents during the term of this contract, Contractor will repair and restore at its sole cost any such property and correct any damages inflicted thereto, returning it to as good a condition as the property was in before being damaged, in a manner satisfactory to the owner(s) of the property for the damage suffered.

D. OTHER REQUIREMENTS

1. Contractor shall comply with all federal, state, and local laws and regulations applicable to the performance of its work under this contract including business license requirements of the City of Tallmadge.
2. Contractor shall not pull the crew off-line for work in another locale without first receiving permission from the City Service Director.

E. AWARD PROCESS

1. Contracts will be awarded based on the sum of lowest and best bidder for site construction services.
2. The Board of Control reserves the right to reject any or all bids and to accept the bid(s) deemed most beneficial to the City of Tallmadge. 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 three percent (3%) higher, subject to a maximum amount of ten thousand dollars (\$10,000.00), then the lowest dollar bid submitted by non-local bidders. The Board of Control's decision in making such an award shall be final.
3. 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.

F. QUESTIONS AND ADDENDA

1. All questions should be submitted in writing at least five (5) business days prior to the bid opening. Answers to questions will be issued in writing as official addenda no later than seventy-two (72) business hours prior to the time of the bid opening. Said addenda will become a component of the invitation to bid and should be acknowledged as received on the proposal page. Failure to acknowledge all official addenda in this manner may result in your bid being disqualified.
2. All questions should be directed to:
Tina Fiocca
City of Tallmadge Service Department
Email: tfiocca@tallmadge-ohio.org
3. Bidders are expected to and responsible for monitoring the Vendor Registry for all official addenda.
4. Oral instructions or decisions, unless confirmed by addenda, will not be considered valid, legal or binding.
5. Please be advised that when you submit a bid to the City of Tallmadge, the City will assume that an authorized representative of your company reviewed said bid to assure that the bid is correct and/or accurate.
6. Any bidder may withdraw a bid, by written request, at any time prior to the time set for the bid opening. This request must be made to Michael Rorar, Director of Public Service at mrorar@tallmadge-ohio.org If there is no withdrawal of the bid, in accordance with this procedure, the City reserves the right to enforce said bid prices(s) and/or contract(s).
7. If a bidder attempts to alter any of the terms and/or conditions of these bid specifications the City of Tallmadge may reject said bid.
8. The party submitting a bid is solely responsible for the delivery of the bid to the specified location prior to the deadline for the receipt of bids. The Receptionist Desk copy machine time stamp is the official time used for the deadline of the submission of bids.

G. Prevailing Wage

1. The successful bidder must comply with all State of Ohio Prevailing Wage Rates.
2. Please describe any 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 practices within the past five years.
3. This contract is subject to Ohio Prevailing Wage Laws, Chapter 4115 of the Ohio Revised Code and the Contractor and all subcontractors shall comply with all provisions contained therein or as otherwise provided by this note. The Contractor guarantees that the prevailing wage scale to be paid to all laborers and mechanics employed on this contract shall be in

accordance with the schedule of the prevailing hourly wage and fringe benefits as determined by the Ohio Department of Commerce for the county in which the work is being performed. The failure to pay prevailing wages to all laborers and mechanics employed on this project shall be considered a breach of contract. Such a failure may result in the revocation of the contractor's and/or subcontractor's certificate of qualification and debarment. A schedule of the most current prevailing wage rates may be accessed by logging in/registering with the Ohio Department of Commerce, Labor and Worker Safety Division, Wage and Hour Bureau at the following web address:

<http://198.234.41.198/w3/webwh.nsf/wrlogin/?openform>

The Contractor and all subcontractors shall compensate the employees on this contract at a pay rate not less than the hourly wage and fringe rate listed on the website noted above, for the applicable job classification or as may be modified by the Ohio Department of Commerce, Division of Labor and Worker Safety Wage and Hour Bureau, when new prevailing rates are established.

Overtime shall be paid at one and one-half times the basic hourly rate for any hours worked beyond forty hours during a pay week. The Contractor and all subcontractors shall pay all compensation by company check to the worker and fringe benefit program.

4. The wage and fringe rates determined for this project or as may be later modified, shall be posted by the Contractor in a prominent and accessible place on the project, field office, or equipment yard where they can be easily read by the workers or otherwise made available to the workers. On the first pay date of contract work the Contractor and all subcontractors shall furnish each employee covered by prevailing wage a completed form (WHPW-1512) in accordance with section 4115.05 of the Ohio Revised Code, showing the classification, hourly pay rate, and fringes, and identifying the public authority's Prevailing Wage Coordinator, if such employees are not covered by a collective bargaining agreement or understanding between employers and bona fide organizations of labor. These forms shall be signed by the Contractor or subcontractor and the employee and kept in the Contractor's or subcontractor's payroll files.
5. The Contractor and all subcontractors shall submit to the Service Department, certified payrolls on form WHPW-1512 or equivalent, in accordance with sections 4115.07 and 4115.071 (C) of the Ohio Revised Code, three weeks after the start of work and every subsequent week until the completion of the contract. Additionally, a copy of the "Apprentice Certification" obtained from the Ohio State Apprenticeship Council, must accompany all certified payrolls submitted, for all apprentices working on this project. Upon completion of the contract and before the final payment, the Contractor shall submit to the Service Department a final wage affidavit in accordance with section 4115.07 of the Ohio Revised Code stating that wages have been paid in conformance with the minimum rates set forth in the contract. Please be aware that it is ultimately the responsibility of the Contractor to ensure that all laws relating to prevailing wages in Chapter 4115 of the Ohio Revised Code are strictly adhered to by all subcontractors.

6. The Contractor and all subcontractors shall make all of its payroll records available for inspection, copying or transcription by any authorized representative of the contracting agency. Additionally, the Contractor and all subcontractors shall permit such representatives to interview any employees during working hours while the employee is on the job. Department, and payment will be withheld for any work not complying with the above referenced specs until the deficiencies are corrected. Deficiencies shall be corrected at the sole expense of the contractor.

H. Time of Completion and Liquidated Damages

1. The bidder shall commence work on the project and various elements thereof on or before **Oct. 1, 2024**, or as modified in a written "Notice to Proceed" of the project within **220** consecutive calendar days thereafter. Refer to **SPECIAL NOTES** portion of the bid documents for all items that have specific contract time constraints. The bidder shall also pay as liquidated damages the sum of \$500 for each consecutive calendar day thereafter as hereinafter provided. The contractor shall continue to pay liquidated damages in the amount indicated until such time that all work is substantially complete.

SECTION IV: PROPOSAL AND SIGNATURE PAGE
City of Tallmadge Howe Road Park Improvements Phase 2

Base Bid Prices are for Informational Purposes Only. Total Unit Prices will govern.

Spec. Item	ITEM No.	DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE		TOTAL AMOUNT
					(IN FIGURES)	(IN WORDS)	
		LAYOUT AND STAKING	1	L.S.			
		EROSION CONTROL INCLUDING SILT FENCE	1	L.S.			
		EARTHWORK & CLEARING	1	L.S.			
		ASPHALT ROAD, PARKING ASPHALT & AGGREGATE BASE	964	S.Y.			
		PAVEMENT MARKINGS	1	L.S.			
		CONCRETE WALKS AND PADS (INCLUDING SHELTER, GRILL, & DOG BOWL PADS)	441	S.Y.			
		CONCRETE PARKING SPACES (VEHICULAR)	125	S.Y.			
		ADA SIGNS AND STOP SIGN	6	EA.			
		CHAIN LINK FENCES AND GATES	1,909	L.F.			
		RESTROOM BUILDING (Including utilities w/in 5')	1	L.S.			
		RESTROOM DOWNSPOUT DRAINS	100	L.F.			
		PICNIC SHELTER ELECTRIC	1	L.S.			
		PICNIC SHELTER INSTALLATION	1	L.S.			
		ELECTRIC TRENCH, CONDUIT, WIRE FROM POWER PANEL TO RESTROOM AND TO SHELTER	455	L.F.			
		GRILL	1	L.S.			
		WATER LINE CONNECTION TO RESTROOM	1	L.S.			

Spec. Item	ITEM No.	DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE		TOTAL AMOUNT
					(IN FIGURES)	(IN WORDS)	
		1" WATER LINE WITH FITTINGS (INCL TRENCH, BACKFILL, & SURFACE REPAIR)	293	L.F.			
		6' SANITARY SEWER LINE, TRENCH, BACKFILL, & CLEANOUTS	160	L.F.			
		EARTHWORK & CLEARING	1	L.S.			
		DOG DRINKING BOWLS WITH VALVE AND DRAIN PIT AT EACH	3	EAC H			
		SEEDING	8,460	S.Y.			
		MOBILIZATION & GENERAL CONDITIONS	1	L.S.			

Authorized Signature _____

TOTAL BID PROPOSAL: \$ _____

Section VI: TALLMADGE CODEIFIED ORDINANCE

Ordinance 2023-75

Presented by:
Director of Public Service Michael Rorar

AUTHORIZING THE DIRECTOR OF PUBLIC SERVICE TO ADVERTISE FOR BIDS AND THE MAYOR TO ENTER INTO A CONTRACT FOR THE HOWE ROAD PARK PHASE 2 IMPROVEMENT PLAN AND PROVIDING FOR IMMEDIATE ENACTMENT

WHEREAS, Council deems it in the best interest of the City to keep local parks safe and enjoyable for the public; and

WHEREAS, Council appropriated American Rescue Plan Act funds in the 2023 Annual Appropriation to complete the Howe Road Phase 2 Park Improvements; and

WHEREAS, the Phase 2 Improvements include a dog park, new restroom facilities, a new shelter, and a parking lot.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF TALLMADGE, COUNTIES OF SUMMIT AND PORTAGE, STATE OF OHIO:


SECTION 1. That the Mayor, acting through the Director of Public Service, is hereby authorized to advertise for bids and to contract with the lowest and best bidder upon proper approval by the Board of Control for the Howe Road Park Phase 2 Improvement Plan.

SECTION 2. That such written contract shall be awarded under the provisions of Tallmadge Codified Ordinance Chapter 143 and shall be approved as to form and correctness by the Director of Law and proper certification of funds by the Director of Finance.

SECTION 3. That it is found and determined that all formal actions of this Council concerning and relating to the adoption of this ordinance were adopted in an open meeting of this Council, and that all deliberations of this Council and of any of its committees on or after November 28, 1975 that resulted in such formal action, were in meetings open to the public, in compliance with all legal requirements including Section 121.22 of the Ohio Revised Code.

SECTION 4. That this ordinance is necessary to provide for and to accomplish the purposes herein set forth, which are conducive to the health, safety, and welfare of the citizens of Tallmadge. For that reason, provided this ordinance shall receive the affirmative vote of three-fourths of the members of Council and approval by the Mayor, it shall be enacted immediately and shall be of immediate effect.

Passed: 8-10-23


Susan E. Burton, Clerk of Council
MER/jt
8/7/23
Filed with the Mayor 8-10-23


Dennis K. Loughry, President of Council

Approved:

David G. Kline, Mayor

This 10th day of Aug., 2023

Section VIII: BIDDER REFERENCES

Complete the following information about Municipalities, which have been serviced by the contractor for similar work, within a 30-mile radius of the City of Tallmadge.

Municipality	Address	Contact:	Phone Number

Section X: PREVAILING WAGE REQUIREMENTS

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. The documents outlined below are contained in the following pages and will be utilized to comply with these requirements.

DOCUMENTATION REQUIREMENTS

The successful bidder will be required to submit all required documentation and certified payrolls per the requirements stipulated in Ohio Revised Code Chapter 4115 as work progresses to the City of Tallmadge Service Department.

PREVAILING WAGE AFFIDAVIT OF COMPLIANCE

This affidavit must be submitted to the City of Tallmadge Service Department before the surety is released or final payment is made.

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.

Payrolls

The Contractor must submit to the City of Tallmadge Service Department **original, certified, signed payrolls** containing the following information:

- A) Name of each employee
- B) Employees' social security numbers
- C) Specific 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."

Prevailing Wage Affidavit of Compliance

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

Do hereby certify that the wages paid to all employees of _____
(Company Name)

for all hours worked on the _____
(Project and Location)

project, during the period from _____ to _____
(Project Dates)

are in compliance with State prevailing wage requirements.

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)

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.

Section XI: TECHNICAL SPECIFICATIONS

PROJECT NO. 22104

HOWE ROAD PARK IMPROVEMENTS PHASE 2

TECHNICAL SPECIFICATIONS TABLE OF CONTENTS

DIVISION 03 - CONCRETE

033000 CAST-IN-PLACE CONCRETE

DIVISION 04 - MASONRY

042000 UNIT MASONRY

DIVISION 05 – METALS

055000 METAL FABRICATIONS

055213 PIPE AND TUBE RAILINGS

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

061053 ROUGH CARPENTRY

061600 SHEATHING

061753 SHOP-FABRICATED WOOD TRUSSES

064023 INTERIOR ARCHITECTURAL WOODWORK

066400 PLASTIC PANELING

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

072100 THERMAL INSULATION

072600 VAPOR RETARDERS

074113 STANDING-SEAM METAL ROOF PANELS

074646 FIBERCEMENT SIDING AND TRIM

076200 SHEET METAL FLASHING AND TRIM

079200 JOINT SEALANTS

DIVISION 08 – OPENINGS

081113 HOLLOW METAL DOORS AND FRAMES

087100 DOOR HARDWARE

089119 FIXED LOUVERS

DIVISION 09 – FINISHES

099123 INTERIOR PAINTING

099300 STAINING AND TRANSPARENT FINISHING

DIVISION 10 – SPECIALTIES

101400 SIGNAGE

102800 TOILET, BATH, AND LAUNDRY ACCESSORIES

DIVISION 12 – SITE FURNISHINGS

129300 SITE FURNISHINGS

DIVISION 31 - EARTHWORK

311000 SITE CLEARING

312000 EARTH MOVING

312319 DEWATERING
312500 EROSION AND SEDIMENT CONTROL
313116 TERMITE CONTROL

DIVISION 32 - EXTERIOR IMPROVEMENTS

321216 ASPHALT PAVING
321313 CONCRETE PAVING
321373 CONCRETE PAVING JOINT SEALANTS
321723 PAVEMENT MARKINGS
321726 TACTILE WARNING SURFACES
323113 CHAIN LINK FENCING
329200 TURF AND GRASSES

DIVISION 33 - UTILITIES

333000 SANITARY SEWERAGE UTILITIES
334100 STORM UTILITY DRAINAGE PIPING
334600 SUBDRAINAGE

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

- A. Material certificates.
- B. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, See S-001
 - a. Fly Ash: ASTM C 618, See S-001.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
 - 1. Maximum Coarse-Aggregate Size: $\frac{3}{4}$ inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 VAPOR RETARDERS

- A. Sheet Vapor Barrier: ASTM E 1745, Class A not less than 15 mils thick, with permeance as tested before and after mandatory conditioning (ASTM 1745 Section 7.1E subparagraph 7.1.1 – 7.1.5) less than .01 perms. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Products: Subject to compliance with requirements, provide one of the following:
 1. Viper VaporCheck II 15 mil Vapor Barrier
 2. Stego 15 mil Vapor Barrier
 3. Or Approved Equal

2.6 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752 cork or self-expanding cork.

2.8 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, as needed to reduce the total amount of Portland cement, which would otherwise be used by not less than 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

- D. Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: .049.
 3. Slump Limit: 8 inch for concrete with verified slump of 2 to 4 inches before adding water reducing or plasticizing admixture, plus or minus 1 inch.
 4. Air Content: 5.5 percent plus or minus 1.5 percent at point of delivery for 1-½ inch nominal maximum aggregate size.
 5. Air Content: Six percent (6%), plus or minus 1.5 percent at point of delivery for ¾ nominal maximum aggregate size.
 6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.9 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete unless otherwise noted.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Barriers: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions. Place sheets in position with longest dimension parallel with direction of pour.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
 - 2. Apply seam tape to a clean and dry vapor barrier
 - 3. Seal all penetrations (including pipes) per manufacturer's instructions
 - 4. Avoid the use of non-permanent stakes driven through vapor barrier.
 - 5. If non-permanent stakes are driven through vapor barrier, repair as recommend by manufacturer.
 - 6. Repair damaged areas with vapor barrier material similar (or better) permeance, puncture, or tensile properties.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 - 2. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch: Surfaces to receive concrete floor toppings, mortar setting beds for cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish and measure surface so gap at any point between concrete surface and an unveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on project.

3.10 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Decorative concrete masonry units.
- B. This section supplements General Structural Notes Drawing.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples: For each type and color of the following:
 - 1. Decorative CMUs.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet (6 m) vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS.

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units.
- C. Decorative CMUs: ASTM C 90.
 - 1. **Basis of Design: Schory Cement Products, Emerald Series: Color Teak**
 - 2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 - 3. Density Classification: Normal weight.
 - 4. Pattern and Texture:
 - a. Standard pattern, ground-face finish.

2.3 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
- G. Aggregate for Mortar: ASTM C 144.
 - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- H. Aggregate for Grout: ASTM C 404.
- I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
- J. Water: Potable.

2.4 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 5. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.

6. Provide in lengths of not less than 10 feet (3 m).

2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- C. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
 1. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees and hemmed.
 2. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
 3. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
 1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
 3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum

foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch (0.8 mm).

4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
 5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.02 mm) thick.
- C. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.
 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
 3. Vinyl Weep Hole/Vent: Units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Architect.

2.8 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.9 MASONRY-CELL FILL

- A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay CMUs as follows:
 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-CELL FILL

- A. Pour loose-fill insulation into cavities to fill void spaces. Maintain inspection ports to show presence of fill at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of fill to one story high, but not more than 20 feet (6 m).

3.6 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 3. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.
 - 4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 24 inches (610 mm), around perimeter.

3.7 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
 - 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 - 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
 - 1. Use specified weep/cavity vent products or open head joints to form weep holes.

2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

3.8 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 3. Protect adjacent surfaces from contact with cleaner.
 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.9 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. This section supplements Rough Carpentry Specification Section on Structural Drawing S0.1.

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Wood furring.
 - 4. Wood sleepers.
 - 5. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 061600 "SHEATHING" for roof and wall sheathing.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.
- C. Timbers: Lumber of 5 inches nominal or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Manufacturer's complete installation instructions and details for framing, blocking and sheathing of engineered framing components including but not limited to LVL, "I" beam floor joists, headers and rim joists.
 - 3. Manufacturer's complete installation instructions and details for each size, type and locations of anchors and mounting hardware.
 - 4. Design and installation requirements including but not limited to truss bridging, anchoring hardware used at bearing walls and beams, field repairs and modifications are

the sole responsibility of the licensed truss engineer to design both framing lumber and heavy wood trusses. See Delegated Design under Article 1.6 A. of QUALITY ASSURANCE of this Section.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Data for each of the following:
1. Preservative-treated wood.
 2. Fasteners used with preservative-treated wood.
 3. Power-driven fasteners.
 4. Post-installed anchors.
 5. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: See Rough Carpentry Specification on Structural Drawing S-001 for, pre-engineered trusses, engineered framing (LVL beams, headers, "I" beam floor joists and glue laminated) heavy timber, dimensional lumber design criteria requirements.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, waterproofing and as indicated on the Drawings.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete and as indicated on the Drawings.

2.3 DIMENSION LUMBER FRAMING

- A. Deck and Stair Framing: Construction or No. 2 grade and any of the following species:
 - 1. Southern pine; SPIB.
 - 2. Spruce-pine-fir; NLGA.
 - 3. Douglas fir-larch (North); NLGA.

2.4 POSTS

- A. Dimension Lumber Posts: No. 2 grade and any of the following species:
 - 1. Douglas fir-larch, Douglas fir-larch (North).
 - 2. Mixed southern pine; SPIB.
 - 3. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.

2.5 MISCELLANEOUS TIMBER MATERIALS

- A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
- B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.

3. Furring.
4. Grounds.
5. Sleepers.

- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing finishes, select boards with no knots.

2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, C-C Plugged, not less than 3/4-inch nominal thickness.

2.8 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems compatible with substrate that meet or exceed structural strength requirements for the application.
- D. Post-Installed Anchors: Use fastener hardware used to anchor the bottom framed wall plate that is acceptable to and compatible with the pressure treated lumber manufacturer and authorities having jurisdiction.
 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.9 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.

- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Structural Drawings. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.
- E. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations.

2.10 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening through interior wall finish to studs; coordinate locations, thickness and required spacing behind backing panels with project requirements.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as required to support facing materials, fixtures, specialty items, hand and guard rails, toilet accessories and trim.

- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 2. Fire block concealed spaces of framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed in contact with Standing Seam Metal Roof Panels install continuous flexible flashing separator between wood and metal roof panels.**
- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. The latest and applicable sections of Ohio Building Code and as required by the authorities having jurisdiction.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully 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. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. General: Install joists with **crown edge up** and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
- N. Install required bridging and blocking as required in written recommendations and requirements of the "I" floor joist manufacturer to meet the framed floor rigidity for project's specific requirements.

- O. Lap members framing from opposite sides of beams or girders not less than 4 inches or securely tie opposing members together.
- P. Refer to Structural Drawings for required types of connection hardware and locations

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding, sleepers or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Coordinate attachment of roof sleepers and sheathing to meet or exceed the structural loads required by the Standing-Seam Metal Roof Panel manufacturer.
- C. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- D. **Verify that all required roof and wall sheathing flashings have been installed** during construction as required in Section 061613 Insulated Wall Sheathing and Section 074113 Standing-Seam Metal Roof Panels.
- E. **Verify that all required shear, crush and anchor blocking, roof truss and floor joist bracing, bridging, and attachment blocking are installed prior to exterior or interior finish materials are applied.**

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood: Install 1-by-3-inch nominal-size furring vertically at 24 inches o.c.
- C. Furring to Receive Interior Wall Finish: Install 1-by-2-inch nominal-size furring as shown on the Drawings.
- D. Furring to Receive Exterior Cement Siding: Install 2-by-4 -inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- A. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber framing if repairs are not approved by Architect.

3.5 PRESERVATIVE SEAL

- A. Apply clear preservative immediately after installation: Basis of Design product is Wolman Oil-Base Rain Coat clear water repellent.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

PART 2 - PRODUCTS

2.1 WALL SHEATHING

- A. Plywood Wall Sheathing: APA Rated, 16/0, Exposure 1 sheathing.

2.2 ROOF SHEATHING

- A. Plywood Roof Sheathing: APA Rated, 32/16, Exterior, Exposure 1 sheathing.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 1. For roof and wall sheathing, provide fasteners of Type 304 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 061600

SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section supplements General Structural Notes on Drawings.
- B. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood truss bracing.
 - 3. Metal truss accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Provide all drawings and calculations as soon as possible. Final building permit approval is contingent upon approval of documents by Local Authorities.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

2.2 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

2.4 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

2.5 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061053 " Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.

END OF SECTION 061753

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior standing and running trim.
 - 2. Ceiling boards and interior trim.
 - 3. Miscellaneous materials.

1.2 ACTION SUBMITTALS

- A. Samples: Shop-applied color and finish specified for each exposed product and square edge profile for standing, running trim and opening casings.

1.3 FIELD CONDITIONS

- A. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Standing and Running Trim:
 - 1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
 - 2. Species: Doug-fir
 - 3. Cut: Plain sliced/plain sawn
 - 4. Wood Moisture Content: 5 to 10 percent.

5. For trim items wider than available lumber, use veneered construction. Do not glue for width.

C. Paneling and Miscellaneous Trim:

1. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
2. Species: Eastern white pine – minor knots.
3. Pattern: Shiplap siding, actual overall dimensions of 5-1/2 by 11/16 inch (140 by 17 mm), measured on the face and thick edge.
4. Finish: Field applied stain and clear finish.
5. Wood Moisture Content: 5 to 10 percent.

2.3 CEILING BOARDS AND INTERIOR TRIM

A. Softwood Lumber Trim and ceiling boards:

1. Species and Grade: Western red cedar, Clear Heart Grade A; NLGA, WCLIB, or WWPA.
2. Maximum Moisture Content: 15 percent.
3. Face Surface: Smooth S35.
4. Sizes:
 - a. Ceiling Boards: 1-inch x 6-inch planks.
 - b. Trim: As indicated on drawings.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWPA U1; Use Category UC3b.
 - a. Provide where in contact with concrete or masonry where indicated on Drawings.
 - b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - d. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.

2.5 FABRICATION

A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease exposed square edges to radius indicated for the following:
 - a. Exposed edges of Solid-Wood (Lumber) each exposed product and profile for standing, running trim and opening casings: 1/16 inch unless otherwise indicated.

- b. Exposed edges of each exposed product and profile for standing, running trim and opening casings, rails and similar members more than 3/4 inch thick: 1/8 inch.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWP A M4.
- F. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails for exposed fastening, **COUNTERSUNK AND FILLED FLUSH WITH INTERIOR ARCHITECTURAL WOODWORK.**
 - 3. For shop-finished items, use filler matching finish of items being installed.
- G. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.

2. Do not use pieces less than **96 inches** long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

END OF SECTION 064023

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crane Composites, Inc.
 - b. Glasteel.
 - c. Marlite.
 - d. Newcourt, Inc.
 - e. Nudo Products, Inc.
 - f. Parkland Plastics, Inc.
2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 200 or less.
 - b. Smoke-Developed Index: 450 or less.
3. Nominal Thickness: Not less than 0.09 inch (2.3 mm).
4. Surface Finish: Smooth.
5. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.

1. Color: Match paneling color.
- B. Sealant: Mildew-resistant, single-component, neutral-curing or acid-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints where indicated or to provide equal panels at ends of walls not less than half the width of full.

3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive and nails (if concealed).
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber blanket insulation.
1. Extruded polystyrene foam-plastic board insulation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 1. R-value as indicated on Drawings.

2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD:

A. Extruded Polystyrene Board:

1. ASTM C518, C177 – Thermal Resistance per inch-R5.
2. ASTM D1621 – 45-psi minimum compressive strength.
3. ASTM C578 – Type 7.
4. ASTM C272 – Water absorption – 0.1%.
5. ASTM E 84 - Type VII; maximum flame-spread 25 and smoke-developed index 450
6. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - d. Pactiv Building Products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For wood-framed construction, install blankets according to ASTM C1320 and as follows:
 - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls.

END OF SECTION 072100

SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY VAPOR RETARDERS

- A. Vapor retarders to protect from vapor transmission into insulated cavities.
- B. Section Includes:
 - 1. Polyethylene vapor retarders.
 - 2. Reinforced-polyethylene vapor retarders.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D4397, 10-mil thick sheet, with maximum permeance rating of 0.1 perm.

2.2 REINFORCED-POLYETHYLENE VAPOR RETARDERS

- A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 20 lb/1000 sq. ft., with maximum permeance rating of 0.1 perm.

PART 3 - EXECUTION

3.1 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs / joists bays and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.

- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION 072600

SECTION 074113 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes standing-seam metal roof panels.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product including, but not limited to, trim, flashings, closures, and anchorage systems.
- B. Sustainable Design Submittals:
 - 1. Product Test Reports: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirements.
 - 2. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Samples: For each type of metal panel indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Warranties.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

- B. Solar Reflectance Index (SRI): Three-year-aged SRI not less than 32 or initial SRI not less than 39 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- C. Energy Performance: Provide roof panels that are listed on the EPA/DOE's ENERGY STAR "Roof Product List" for steep-slope roof products.
- D. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
 - 2. Three-year, aged Solar Reflectance Index of not less than 64 when calculated according to ASTM E 1980.
- E. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
- B. Tapered-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AEP Span; a BlueScope Steel company.
 - b. Architectural Metal Systems; a Nucor company.
 - c. Berridge Manufacturing Company.
 - d. Butler Manufacturing; a BlueScope Steel company.
 - e. CENTRIA Architectural Systems.
 - f. Fabral.
 - g. Firestone Metal Products, LLC.
 - h. Flexospan Steel Buildings, Inc.
 - i. McElroy Metal, Inc.
 - j. Metal Sales Manufacturing Corporation.
 - k. Morin; a Kingspan Group company.
 - l. Petersen Aluminum Corporation.
 - m. Union Corrugating Company.

- n. VICWEST.
- 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 24 gauge.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Evergreen, to match adjacent Pavilion.
- 3. Major-Rib Spacing: 12 inches (305 mm) o.c.
- 4. Panel Coverage: 36 inches (914 mm).
- 5. Panel Height: 1.5 inches (38 mm).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
- B. Felt Underlayment: ASTM D 226/D 22M, Type II (No. 30), asphalt-saturated organic felts.
- C. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
 - 1. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 2. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- C. Gutters and Downspouts: Plain rectangular, formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.
- D. Downspout Boot: Provide cast iron downspout boot transition to drainage piping.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.6 FINISHES

- A. Panels and Accessories:

1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
2. Finish Color: Evergreen, to match pre-engineered pavilion.
3. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer. Apply over the entire roof area.
 1. Thermal Stability: Stable after testing at 220 deg F (111 deg C); ASTM D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Grace Ice and Water Shield HT.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Kirsch Building Products, LLC; Sharkskin Ultra SA.
 - e. Metal-Fab Manufacturing, LLC; MetShield.
 - f. Owens Corning; WeatherLock Specialty Tile and Metal Underlayment.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

3.3 MISCELLANEOUS MATERIALS

- A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- C. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.
- D. Roof Curbs: Fabricated from same material as roof panels, 0.048-inch- (1.2-mm-) nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch- (1.52-mm-) nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
- E. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- F. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

3.4 METAL PANEL INSTALLATION

- A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - 5. Flash and seal panels with weather closures at perimeter of all openings.
 - 6. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113

SECTION 074646 – FIBER CEMENT SIDING AND TRIM

PART 1 - GENERAL

- 1.1 SUMMARY: Section includes fiber-cement siding, trim, soffit, and accessories.
- A. See Section 076200 SHEET METAL FLASHING & TRIM for formed wall and roof sheet metal flashings.
 - B. See Section 079200 JOINT SEALANTS for Joint-sealant application, joint location, and joint preparation requirements.
 - C. See Section 074113 STANDING SEAM METAL ROOF PANELS to coordinate required roof ventilation details.
- 1.2 ACTION SUBMITTALS
- A. Product Data: For each type of product indicated.
 - B. Samples: 12” sample showing texture of each type of siding, panels and trim used.
 - C. Manufacturer’s complete installation instructions including flashing, painting, and sealant installation requirements for fiber-cement products.
 - D. Fasteners for fiber cement siding & trim, use hot-dip galvanized or stainless-steel fasteners and as directed by Manufacturer’s installation instructions.
- 1.3 CLOSEOUT SUBMITTALS
- A. Maintenance data.
 - B. Manufacturer issued Warranty.
- 1.4 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish full lengths of each siding and trim types including related accessories, in a quantity equal to 2 percent of amount installed.
- 1.5 QUALITY ASSURANCE
- A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

- B. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from single source from single manufacturer.

1.6 WARRANTY

- A. Special Warranty (fiber cement siding & trim): Standard Manufacturer's Warranty in which manufacturer agrees to repair or replace siding that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING AND TRIM

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide James Hardie products or comparable product by one of the following:
 - a. Cemplank.
 - b. CertainTeed Corp.
 - c. GAF Materials Corporation.
 - d. MaxiTile, Inc; a California corporation.
 - e. Nichiha Fiber Cement.
 - 2. Types and Patterns:
 - a. Texture: Smooth.
- B. Trim
 - 1. Width: Boards 3-1/2 inches or 5-1/2 inches wide in style, as indicated in drawings.
 - 2. Thickness: Not less than 1 inch
 - 3. Texture: Smooth.
- C. Panel Siding (Board and Batten appearance)
 - 1. Size: Vertical siding panel 0.312 inches thick, 4 feet by 10 feet.
 - 2. Finish Texture: Smooth.
- D. Battens:
 - 1. Size: 0.75 inches thick, 2.5 inches wide.
 - 2. Finish Texture: Smooth.
- E. Factory Painting: Color selected from Manufacturer's standard colors.

2.2 FIBER-CEMENT SOFFIT

- A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested in accordance with ASTM E136; with a flame-spread index of 25 or less when tested in accordance with ASTM E84.
- B. Nominal Thickness: Not less than 5/16 inch (8 mm).
- C. Pattern: 24-inch- (600-mm-) wide sheets with smooth texture.
- D. Factory Painting: Color selected from Manufacturer's standard colors.

2.3 ACCESSORIES

- A. Flashing: Provide prefinished flashing at all windows and door heads, starting course directly above decking and roofing and at all individual siding head seams. Coordinate siding and insulated wall sheathing.
- B. Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer required for installations shown on the Drawings.
- C. See Section 079200 JOINT SEALANTS for Joint-sealants and joint preparation requirements.
- D. Fasteners:
 - 1. Strictly follow siding & trim manufacturer's fastener requirements and nailing patterns and fastener types.
 - 2. Use fasteners of sufficient length to penetrate a minimum of 1 inch into wall framing or furring.
- E. Insect Screening for Soffit Vents: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh or PVC-coated, glass-fiber fabric, 18-by-14 or 18-by-16 (1.4-by-1.8- or 1.4-by-1.6-mm) mesh.
- F. Continuous Soffit Vents: Aluminum, hat-channel shape.
 - 1. Net-Free Area: 4 sq. in./linear ft. (280 sq. cm/m).
 - 2. Finish: Mill finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall sheathing and substrates for compliance with requirements for siding & trim installation tolerances and other conditions affecting performance of siding and related accessories.
- B. Verify that all insulated wall sheathing seams are taped, and all penetrations are sealed to form continuous weathertight surface.

- C. Apply metal and tape flashings at all openings, fastener, and wall connections (deck ledger) and penetrations.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION - SIDING

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - 2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.
 - 3. Gap siding and Trim and install joint sealants as specified by siding manufacturer and to produce weathertight installation.
 - 4. Install fasteners no more than 24 inches on center or as required by manufacturer with 1" minimum penetration into wood stud framing.
- B. Install fasteners in siding flush with surface. Fasteners that create divots must be filled and sanded smooth.**

3.3 INSTALLATION - TRIM BOARDS AND FASCIA

- A. Install materials in strict accordance with manufacturer's installation instructions. Install flashing around all wall openings.
- B. Fasten trim into structural framing or code complying. Fasteners must penetrate minimum 1 inch or full thickness of sheathing. Additional fasteners may be required to ensure adequate security.
- C. Place fasteners no closer than 3/4 inch and no further than 2 inches from side edge of trim board and no closer than 1 inch from end. Fasten maximum 16 inches on center or as directed by manufacturer, whichever is smaller.
- D. Install fasteners in trim boards flush with surface. Fasteners that create divots must be filled and sanded smooth.**
- E. Install joint sealants as specified in Section 079200 "Joint Sealants" and siding manufacturer to produce weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Formed wall sheet metal fabrications.

B. Related Requirements:

- 1. Section 061053 "Rough Carpentry" for wood nailers, curbs, and blocking.
- 2. Section 074113 "Standing-Seam Metal Roof Panels" for materials and installation of sheet metal flashing and trim integral with roofing.
- 3. Section 074646 "Fibercement Siding and Trim" for required sheet metal flashing.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include manufacturer's construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Samples for Verification: For each type of exposed finish.

- 1. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.
- 2. Stainless and prefinished sheet metal flashing and trim

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricates sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are SPRI ES-1 tested and approved, shop shall be listed as able to fabricate required details as tested and approved.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Color: As selected by Architect from manufacturers full range of standard colors.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: Stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape in widths required and 1/8 inch thick to provide a water and wind tight seal.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with all exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Do not use lapped expansion joints.
- E. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- I. Do not use graphite pencils to mark metal surfaces.

2.5 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch thick.

2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Mechanical Louver Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that flexible flashing has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated, masonry other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 2. Do not use lapped expansion joints.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints where necessary for strength.

3.3 PITCHED ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Preformed joint sealants.
5. Acoustical joint sealants.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers samples of materials that will contact or affect joint sealants. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction compatibility and adhesion test reports.
- C. Preconstruction field-adhesion test reports.

- D. Warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 1 year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant Silicone Joint Sealant: ASTM C 920.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Building Systems.
 - b. Dow Corning Corporation.
 - c. GE Advanced Materials - Silicones.
 - d. May National Associates, Inc.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.
 - g. Schnee-Morehead, Inc.
 - h. Sika Corporation; Construction Products Division.
 - i. Tremco Incorporated.
 - j. Approved equal.
2. Type: Single component (S).
 3. Grade: nonsag (NS).
 4. Class: 50.
 5. Uses Related to Exposure: Nontraffic (NT).

2.3 URETHANE JOINT SEALANTS

A. Urethane Joint Sealant: ASTM C 920.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF Building Systems.
 - b. Bostik, Inc.
 - c. Lyntal, International, Inc.
 - d. May National Associates, Inc.
 - e. Pacific Polymers International, Inc.
 - f. Pecora Corporation.
 - g. Polymeric Systems, Inc.
 - h. Schnee-Morehead, Inc.
 - i. Sika Corporation; Construction Products Division.
 - j. Tremco Incorporated.
 - k. Approved equal.
2. Type: multicomponent (M).
3. Grade: Pourable (P).
4. Class: 50.
5. Uses Related to Exposure: Traffic (T).

2.4 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between plant-precaster architectural concrete paving units.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Urethane.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - e. Control and expansion joints in ceilings and other overhead surfaces.
 - f. Other joints as indicated.
 - 2. Joint Sealant: Silicone.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 2. Joint Sealant: Urethane.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.
 - d. Joints on underside of plant-precast structural concrete beams and planks.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - f. Other joints as indicated.
 2. Joint Sealant: Latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated.
 2. Joint Sealant: Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
- C. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.
 - 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Informational Submittals:
 - 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- D. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

- A. **Manufacturers Qualifications:** Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. **Certified Products:** Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. **Installer Qualifications:** A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. **Door Hardware Supplier Qualifications:** Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. **Source Limitations:** Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
 - 1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 - 4. Hinge Options: Comply with the following:

- a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

- a. Hager Companies (HA) - BB Series, 5 knuckle.
- b. McKinney (MK) - TA/T4A Series, 5 knuckle.
- c. dormakaba Best (ST) - F/FBB Series, 5 knuckle.

- B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:.

- a. Hager Companies (HA).
- b. Pemko (PE).
- c. Dormakaba Best (ST).

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.

- 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
- 2. Furnish dust proof strikes for bottom bolts.
- 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
- 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Rockwood (RO).
- c. Trimco (TC).

2.4 CYLINDERS AND KEYING

- A. Cylinders and Keying to match Owner's standard.

1. Manufacturers:

- a. Dormakaba Best (ST).

B. Cylinder Types:

1. Cylinder compatible with Trilogy DL2800 Mechanical lock and latching device.
2. Keyway: Match Facility Standard.
- 3.

C. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Two (2).

D. Construction Keying: Provide construction master keyed cylinders.

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Economy audit trail pushbutton lock:

1. Owner's standard: Trilogy: DL2800.
2. Standalone access control system with audit trail.
3. Battery-operated

2.6 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.

2.7 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series.
 - b. LCN Closers (LC) - 4040 Series.
 - c. Norton Rixson (NO) - 7500 Series.
 - d. Yale Commercial (YA) - 4400 Series.

2.8 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Rockwood (RO).
- c. Trimco (TC).

2.9 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

- a. Burns Manufacturing (BU).
- b. Hiawatha, Inc. (HI).
- c. Rockwood (RO).
- d. Trimco (TC).

- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

- a. Norton Rixson (RF).
- b. Rockwood (RO).

2.10 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.11 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.12 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical hardware to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.

2. The supplier is responsible for handing and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
8. NO - Norton
9. TR - Trilogy
10. BE - Best

Hardware Sets

Set: 1.0

Doors: 01, 02, 03

3 Hinge, Full Mortise	TA2314 [NRP] FT	US32D MK
1 Pushbutton Lock	DL2800	626 TR
1 Cylinder	ICB-7812	626 BE
1 Surface Closer	7500	689 NO
1 Threshold	273x224_FGT x Length Required x MSES25SS	PE
1 Gasketing	303_S (Head & Jambs)	PE
1 Rain Guard	346_ x Width of Frame Head	PE
1 Sweep	315_N x Door Width	PE
1 Kick Plate	K1050 12" high CSK BEV	US32D RO

Set: 2.0

Doors: 04

6 Hinge, Full Mortise	TA2714 [NRP] FT	US26D MK
1 Dust Proof Strike	570	US26D RO
2 Flush Bolt	555 / 557 (As Required)	US26D RO
1 Pushbutton Lock	DL2800	626 TR
1 Cylinder	ICB-7812	626 BE

2 Surf Overhead Stop	10-X36	630	RF
2 Silencer	608		RO
2 Kick Plate	K1050 12" high CSK BEV		US32D RO

END OF SECTION 087100

SECTION 089119 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed extruded-aluminum louvers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and head, jamb and sill attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.

1.3 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 - 1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Structural Drawings.

- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.2 FIXED EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
 - 1. Louver Depth: 4 inches.
 - 2. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
 - 3. Louver Performance Ratings:
 - a. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 300 fpm.
 - b. Free Area: Not less than 54 percent for 48-inch wide by 48-inch high louver.
 - c.
 - 4. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
 - 5. Louver sizes are indicated on drawings.

2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening and insect screening.
- B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 1/2-inch square mesh, 0.063-inch wire.
 - 2. Insect Screening: Aluminum, 18-by-16 mesh, 0.012-inch wire.

2.4 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.

3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
4. For fastening stainless steel, use 300 series stainless-steel fasteners.
5. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.6 ALUMINUM FINISHES

- A. High-Performance Organic Finish: Two-coat fluoropolymer finish. Containing not less than 50 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Color and Gloss: As selected by Architect from manufacturer's full standard range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or hard neoprene washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated. Provide sill extension and head flashing to provide a weathertight installation.
- D. Protect nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 089119

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, where indicated provide products by one or more of the following:
 - 1. Sherwin-Williams
 - 2. Minwax
 - 3. Dura-Seal

4. Benjamin Moore
5. Glidden
6. Kelley-Moore
7. Zinsser

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Fiber-Cement Board: 12 percent.
 3. Masonry (Clay and CMUs): 12 percent.
 4. Wood: 15 percent.
 5. Gypsum Board: 12 percent.
 6. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions by painting contractor.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Clean items to remove signs of installation dirt, fingerprints, etc.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 INTERIOR PAINTING SCHEDULE

- A. Finish Carpentry: Wood trim, Plywood
 - 1. Latex over Latex Primer System:
 - a. Prime Coat: Interior latex primer for wood.
 - b. Intermediate Coat: Matching topcoat.
 - c. Topcoat: Interior, latex, semigloss.
- B. Concrete Substrates, Traffic Surfaces:
 - 1. Water-Based Concrete Floor Sealer System:
 - a. First Coat: Clear Sealer, water based, for concrete floors, matching topcoat.
 - b. Topcoat: Clear Sealer, water based, for concrete floors.
- C. Steel Substrates:
 - 1. Latex over Shop-Applied Quick-Drying Shop Primer System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior (MPI Gloss Level 5).

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry or woodwork).
 - b. Wood-based panel products.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 9 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Wood trim, architectural woodwork, and wood board paneling.
 - 1. Water-Based Varnish:
 - a. First Intermediate Coat: Water-based varnish matching topcoat.
 - b. Second Intermediate Coat: Water-based varnish matching topcoat.
 - c. Topcoat: Varnish, water based, clear, semi-gloss (MPI Gloss Level 5)

END OF SECTION 099300

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Room-identification signs that are directly attached to the building.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplemental General Conditions and Part D – Detail Specification Sections, apply to this Section.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For dimensional characters and room identification signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples: For each sign type and for each color and texture required.
 - 1. Room Identification Signs: Full-size sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.8 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 ROOM IDENTIFICATION SIGNS

- A. Sign Materials: Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- B. Room-Identification Sign: Sign system with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Basis of Design: Subject to compliance with requirements, provide product by ASI Sign Systems, Inc., (or a comparable product acceptable to the Architect.)
 - 2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.125 inch (3.18 mm).
 - b. Surface-Applied Graphics: Applied photo image.
 - c. Color(s): As selected by Architect from manufacturer's full range.
 - 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition Square cut.
 - b. Corner Condition in Elevation: Radius.
 - 4. Mounting: Manufacturer's standard method for substrates indicated, Surface mounted to wall with adhesive.

2.2 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 - 2. Exposed Metal-Fastener Components, General:

- a. Fabricated from same basic metal and finish of fastened sign unless otherwise indicated.
 - b. Furnish inserts, as required, to be set into concrete or masonry work.
- B. Adhesive: As recommended by sign manufacturer.

2.3 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
- 1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
- 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
- 1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

3.2 CLEANING, PROTECTION, AND REPAIR

- A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.
- B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with other sections.

END OF SECTION 101400

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Underlavatory guards.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Warranty
- C. Materials for Owner stock: One or one set of each product listed below with complete hardware set.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

Basis-of-Design Product: Subject to compliance with requirements, provide product indicated below or comparable product by one of the following:

- 1. A & J Washroom Accessories, Inc.
- 2. American Specialties, Inc.
- 3. Bobrick Washroom Equipment, Inc.
- 4. Bradley Corporation.
- 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- 6. Tubular Specialties Manufacturing, Inc.

- A. Soap Dispenser: SD

1. CITY STANDARD PRODUCT: Vandal Stop Products by Atlas American. SKU: AA-SDS-AF-340L-12g.
 - a. Description: Surface Mounted vandal resistant sloped top automatic foaming soap dispenser.
 - b. Material: 204L stainless steel, 12 gauge.

- B. Mirror Unit: MG
 1. Basis-of-Design Product: Bobrick B-290 2436
 2. Frame: Stainless-steel channel.
 - a. Corners: Welded and ground smooth.
 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 4. Size: 24" W x 36" H.

- C. Toilet Tissue (Roll) Dispenser: TTD
 - A. CITY STANDARD PRODUCT: Scott Essential Jumbo Roll Toilet Paper Dispenser (KCC9551) supplied by M. Conley Company.
 1. Description: Surface Mounted Multi-Roll Jumbo Toilet Tissue Dispenser
 2. Capacity: Designed for 2 cored paper rolls 9.38-inch diameter.
 3. Finish: Plastic (color: smoke).

- D. Grab Bar: GB
 1. Basis-of-Design Product:
 - a. Toilet Stall: Bobrick; B-68137.99, with B-6806.99x18
 2. Mounting: Flanges with concealed fasteners.
 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 4. Outside Diameter: 1-1/2 inches (38 mm).
 5. Configuration and Length: As indicated on Drawings.

- E. Sanitary-Napkin Disposal Unit: SND
 1. Basis-of-Design Product: Bobrick, B-270.
 2. Mounting: Surface mounted.
 3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
 4. Receptacle: Removable.
 5. Material and Finish: Stainless steel, No. 4 finish (satin).

- F. Under-Lavatory Guard
 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 2. Material and Finish: Antimicrobial, molded plastic, white.

- G. Coat Hook: CH
 1. Basis-of-Design Product: Bobrick, B-212.

2. Description: Single prong unit with bumper.
3. Material and Finish: Solid cast aluminum with matte finish

2.2 HAND DRYERS

A. Hand Dryer: HD

1. Basis-of-Design Product: Excel Dryer, Inc. ThinAir Hand Dryer, TA-SB
2. Mounting: Surface mounted.
3. Operation: Electronic-sensor activated with timed power cut-off switch.
4. Cover Material and Finish: Brushed Stainless Steel.
5. Electrical Requirements: Refer to electrical drawings.

2.3 CHILDCARE ACCESSORIES

A. Baby Changing Station: CT

1. Basis of Design Product: Koala Kare, KB-200-00
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 - a. Engineered to support minimum of 250-lb (113-kg) static load when opened.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches (100 mm) from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE interior in Cream color.
6. Liner Dispenser: Built in.

2.4 CUSTODIAL ACCESSORIES

A. Mop and Broom Holder: MH

1. Basis-of-Design Product: Bobrick, B-239 x 34
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Hooks: Three.
4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
 - b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

2.5 FABRICATION

- A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 10 keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

END OF SECTION 102800

SECTION 129300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish all labor, materials, tools, equipment, necessary incidentals and supervision required for the installation of site furnishings, as herein specified, and as shown on the construction drawings.
- B. Work Included-
 - 1. Furnish and install all site furnishings, including all Owner-purchased items unless stated otherwise
 - 2. Excavate and pour concrete footings as required.
 - 3. Backfill, compact and restore earthwork around concrete footings.
 - 4. Remove excess dirt from excavated footings and dispose off-site.

1.2 GENERAL REQUIREMENTS

- A. The construction drawings, specifications and the project site shall be carefully examined for thorough familiarization with all existing conditions and limitations and their relationship to effect upon the work included under this section of the specifications. No extra allowance will be made for failure to do so.

1.3 SUBMITTALS

- A. The Contractor shall submit to the Architect catalogue cuts and/or shop drawings on all equipment sufficient to determine the type, quality, and overall combined dimensions, in all directions, installation and design. Substitution will be written by Architect permission only, as covered under General Conditions. All information listed in Section 2.11-A shall be included in shop drawings.
- B. All items to be fabricated only after shop drawings have been submitted and approved by the Architect.

PART 2 - MATERIALS

- 2.1 All site furnishings shall be furnished by the Contractor (see Equipment List) shall be of type, quantity, model and manufacturer as shown or an approved equal.
- 2.2 Concrete work shall conform to Section 033000 - Cast-in-Place Concrete.

2.3 DOG BOWL DRINKING FOUNTAIN

Quantity	Name/Model Number	Manufacturer	Comments
3	M-PM34-FRU1 Freeze Resistant Round Pedestal Push Button Pet Fountain Receptor	Murdock or equivalent	Purchased and Installed by Contractor

2.4 SUBSTITUTIONS

- A. For consideration as an acceptable supplier for the site furnishings, the following documentation shall be received by the Architect ten (10) days prior to bid opening:
- B. The Contractor shall submit to the Architect catalogue cuts and/or shop drawings on substitutes sufficient to determine the type, quality, overall combined dimensions, in all directions, installation and design.
- C. List color options.
- D. Identify all variations from the drawings and specifications in the bidding documents.
- E. Manufacturer's Guarantee and Warranty.
- F. Submit two copies of the above items to the office of Brandstetter Carroll Inc., 1220 W.6th Street, Suite 300 Cleveland, Ohio, 44113, Attention: Dan Joyce.
- G. Acceptable suppliers will be sent a written acceptance letter from the Architect. Addenda to all plan holders indicating the acceptable suppliers will not be issued. The suppliers shall submit the acceptance letter with their quotation, to the General Contractor.
- H. All suppliers must submit the above data to be considered including those listed in the specification as shown on the drawings.

PART 3 - EXECUTION

- 3.1 Installation shall be done in accordance with the manufacturer's instructions, construction drawings, and as specified herein. Where the manufacturer's instructions differ from the construction drawings and specifications, the Contractor shall notify the Architect prior to any installation.
- 3.2 The location of the site furnishings shall be in accordance with the lines and grades as shown on the construction drawings.
- 3.3 Excavations required to receive concrete footings shall be of size and shape as shown on the construction drawings.

- 3.4 Contractor shall stake out location of all site furnishings and shall receive Architect approval prior to installation.
- 3.5 The backfill, compaction and replacing of the earthwork around the concrete footings shall be done after the footings have cured and hardened for not less than two days.
- 3.6 The top of the concrete footings shall not show above the subgrade, unless otherwise shown on the construction drawings.
- 3.7 Horizontal members of the site furnishings shall be level. Vertical members shall be plumb. All angled supports shall be as specified.
- 3.8 Site furnishings shall be held firmly in place and out of use until the concrete has hardened for not less than two days.
- 3.9 Any site furnishing not installed properly as determined by the Architect shall have the concrete footings removed and reinstalled at no cost to the Owner.

END OF SECTION

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Grubbing.
3. Stripping and stockpiling topsoil.
4. Removing above- and below-grade site improvements.
5. Disconnecting, capping or sealing site utilities.
6. Temporary erosion- and sedimentation-control measures.

1.2 MATERIAL OWNERSHIP

- A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- C. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- D. The following practices are prohibited within protection zones:
1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Foot traffic.
 4. Erection of sheds or structures.
 5. Impoundment of water.
 6. Excavation or other digging unless otherwise indicated.
 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 - 1. Obtain approved borrow soil material from off-site sources.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. General: Protect trees and plants remaining on-site.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
 - 1. Arrange with utility companies to shut off indicated utilities.

3.5 CLEARING AND GRUBBING

- A. Remove obstructions and other vegetation to permit installation of new construction.
 - 1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 - 2. Use only hand methods for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches and compact each layer to a density equal to adjacent original ground.
- C. Remove all cleared and grubbed materials from the site and dispose of legally.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to the underlying subsoil in a manner to prevent intermingling
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 GEOTECHNICAL REPORT.

- A. A geotechnical report is not provided for this project.

1.2 SUMMARY

- A. Section Includes:

1. Preparing subgrades for pavements, turf and grasses and plants.
2. Excavating and backfilling for buildings and structures.
3. Drainage course for concrete slabs-on-grade.
4. Subbase course for concrete pavements.
5. Subbase course and base course for asphalt paving.
6. Excavating and backfilling for utility trenches.

1.3 DEFINITIONS

- A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

- D. Borrow Soil: Satisfactory soil borrowed from on and off--site locations for use as fill or backfill. Contractor to coordinate operations with Owners representative.

- E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 PROJECT CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
 - 1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree and Plant Protection."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
 - 1. Clearance: As indicated in drawings.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
- D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course.
- E. Place and compact initial backfill free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 - 1. Under grass and planted areas, use satisfactory soil material.
 - 2. Under walks and pavements, use satisfactory soil material.
 - 3. Under steps and ramps, use engineered fill.
 - 4. Under building slabs, use engineered fill.
 - 5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 or ASTM D 1557:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 100 percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
 - 4. For utility trenches, compact each layer of initial and final backfill soil material at 90 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 - 2. Walks: Plus or minus 1 inch.
 - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
 - 1. Shape subbase course and base course to required crown elevations and cross-slope grades.
 - 2. Place subbase course and base course that exceeds 4 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 4 inches thick or less than 3 inches thick.
 - 3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 98 percent of maximum dry unit weight according to ASTM D 698 or ASTM D 1557.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 - 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 98 percent of maximum dry unit weight according to ASTM D 698.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.17 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 312319 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes construction dewatering.

1.2 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, discharge lines, piezometers, and flow-measuring devices; and means of discharge, control of sediment, and disposal of water.
- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - 1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide temporary grading to facilitate dewatering and control of surface water.
- B. Monitor dewatering systems continuously.
- C. Protect and maintain temporary erosion and sedimentation controls, which are specified during dewatering operations.
- D. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- E. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- F. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- G. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- H. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.
 - 1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

END OF SECTION 312319

SECTION 312500 – EROSION AND SEDIMENTATION CONTROL (INCLUDES SWPPP)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Temporary erosion and sedimentation control measures.
 - 2. Storm Water Pollution Prevention Plan (SWPPP or SWP3)

1.2 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site as specified by the SWPPP with applicable subcontractors, the civil engineer of record, the Owner's Representative, and any applicable governing officials.

1.3 PROJECT CONDITIONS

- A. Review and certify the SWPPP prior to beginning onsite work.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied facilities when installing erosion controls. Coordinate all measures with applicable government authorities having jurisdiction over the connecting, adjacent, or surrounding roadways.
- C. Utility Locator Service: Notify utility locator service for area where Project is located before installing erosion or sediment control measures.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Seed, sod, and or ground covers as indicated on the Drawings.
- B. Erosion/Sediment control devices or Best Management Practices as indicated on the Drawings and in the SWPPP.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review the Storm Water Pollution Prevention Plan attached to this section and all applicable Drawings, checklist, logs, etc.

3.2 IMPLEMENTATION AND DOCUMENTATION

- A. Inspect, repair, and maintain erosion and sedimentation control measures, per the SWPPP, during construction until permanent vegetation has been established.

- B. Execute required site inspection checklists, documents, and site logs in the SWPPP.
- C. Update, maintain, alter, or add temporary erosion and sediment controls in conjunction with the SWPPP and ongoing earthwork activities as required for the Project.
- D. Maintain an up-to-date Site Plan in the field office. Continually update the Site Plan with notations that coordinate with the site checklists and logs per the SWPPP.
- E. The Owner's Representative has the right and authority to limit earth-moving activities and to direct the Contractor to immediately provide permanent or temporary pollution control measures.
- F. Install permanent erosion measures such as pavement and lawn areas as soon as practically possible to minimize temporary pollution control measures.
- G. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 CLOSEOUT DOCUMENTS

- A. Before retainage can be released, the Contractor must provide the Owner with a final copy of all documents making up the SWPPP including plans, checklists, and logs.
 - 1. Retain a copy of the above documentation for a minimum of three years from final acceptance.

END OF SECTION 312500

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Soil treatment with termiticide.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the EPA-Registered Label for termiticide products.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Soil Treatment Application Report: Include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

C. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

- B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
- B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.7 MAINTENANCE SERVICE

- A. Continuing Service: Beginning at Substantial Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

- A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation, Agricultural Products; Termidor.
 - b. Bayer Environmental Science; Premise 75.
 - c. FMC Corporation, Agricultural Products Group; Dragnet FT.
 - d. Syngenta; Prelude.
 - e. Or Approved Equal
 - 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

- A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.2 APPLYING SOIL TREATMENT

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.
- C. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.
- D. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - 1. Slabs-on-Grade and Basement Slabs: Underground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
 - 3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 - 4. Masonry: Treat voids.
 - 5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- E. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

- F. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- G. Post warning signs in areas of application.
- H. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cold milling of existing hot-mix asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt paving overlay.

B. Related Sections:

1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.
2. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants and fillers at paving terminations.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each paving material, from manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 60 deg F.

2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- C. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22.
- B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Spread mix at minimum temperature of 290 deg F.
 - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.7 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.9 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes Concrete Paving
 - 1. Exterior Slabs.
 - 2. Walks.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with ACI 301 unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- E. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

- F. Deformed-Steel Wire: ASTM A 496/A 496M.
- G. Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating. Cut bars true to length with ends square and free of burrs.
- H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.2 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150, white portland cement Type I.
 - a. Fly Ash: ASTM C 618, Class C or Class F.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S, uniformly graded. Provide aggregates from a single source.
- C. Water: Potable and complying with ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

2.3 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.4 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber in preformed strips.

2.5 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 3 inches, plus or minus 1 inch.
4. Air Content: 5-1/2 percent plus or minus 1.5 percent.

- B. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness:
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

- A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, placing, and consolidating concrete.
- C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed paving surface with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these.

3.8 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 1. Elevation: 3/4 inch.
 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
 3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/2 inch.
 4. Joint Spacing: 3 inches.
 5. Contraction Joint Depth: Plus 1/4 inch, no minus.
 6. Joint Width: Plus 1/8 inch, no minus.

3.9 PAVEMENT MARKING

- A. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
- B. Sweep and clean surface to eliminate loose material and dust.
- C. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold-applied joint sealants.

1.2 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, eight, Samples of materials that will contact or affect joint sealants. Use manufacturer's standard test method to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each kind and color of joint sealant required.
- C. Pavement-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Preconstruction compatibility and adhesion test reports.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and

application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
- b. Dow Corning Corporation; 890-SL.
- c. Pecora Corporation; 300 SL.
- d. Or Approved Equal

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- B. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.
- C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

- E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place joint sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - 1. Remove excess joint sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

- G. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

- H. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 321373

SECTION 321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide one of the following:
 1. Aexcel Inc.
 2. Benjamin Moore & Co.
 3. Color Wheel Paints & Coatings.
 4. Columbia Paint & Coatings.
 5. Conco Paints.
 6. Coronado Paint; Division of INSL-X Products Corporation.
 7. Diamond Vogel Paints.
 8. Dunn-Edwards Corporation.
 9. Ennis Traffic Safety Solutions, Inc.
 10. Frazee Paint.
 11. General Paint.
 12. Kwal Paint.
 13. M.A.B. Paints.
 14. McCormick Paints.
 15. Miller Paint.
 16. Parker Paint Mfg. Co. Inc.
 17. PPG Industries.
 18. Pratt & Lambert.
 19. Rodda Paint Co.
 20. Rohm and Haas Company; a subsidiary of The Dow Chemical Company.
 21. Scott Paint Company.
 22. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.
 - 1. Color: White.
- B. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
 - 1. Color: White.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for a minimum of 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath the stencil.
 - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

END OF SECTION 321723

SECTION 321726 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Detectable warning mats applied to existing concrete paving.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for each type of exposed finish requiring color selection.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.
 - 1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

2.2 DETECTABLE WARNING MATS

- A. Surface-Applied Detectable Warning Mats: Accessible truncated-dome detectable warning resilient mats, UV resistant, manufactured for adhering to existing concrete walkway surfaces, with slip-resistant surface treatment on domes, field of mat, and beveled outside edges.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AlertTile; a division of Cape Fear Systems, II, LLC.
 - b. Armor Tile
 - c. Or Approved Equal
 - 2. Material: Modified rubber compound, UV resistant.
 - 3. Color: Federal Yellow No. 33538.
 - 4. Shapes and Sizes:

- a. Rectangular panel, Provide maximum length of panel by 24" per site location.
5. Dome Spacing and Configuration: 1.67-inch spacing, in pattern.
6. Mounting: Adhered to pavement surface with adhesive and fastened with fasteners.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of tactile warning surfaces, noncorrosive and compatible with each material joined, and complying with the following:
 1. Furnish Type 304 stainless-steel fasteners for exterior use.
 2. Fastener Heads: For nonstructural connections, use flathead or oval countersunk screws and bolts with tamper-resistant heads, colored to match tile.
- B. Adhesive: As recommended by manufacturer for adhering tactile warning surfacing unit to pavement.
- C. Sealant: As recommended by manufacturer for sealing perimeter of tactile warning surfacing unit.

PART 3 - EXECUTION

3.1 INSTALLATION OF TACTILE WARNING SURFACING

- A. General: Prepare substrate and install tactile warning surfacing according to manufacturer's written instructions unless otherwise indicated.
- B. Place tactile warning surfacing units in dimensions and orientation indicated. Comply with location requirements of AASHTO MP 12.
- C. Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place and completely seat tile back and embedments in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean using methods recommended in writing by manufacturer.
- D. Removable Cast-in-Place Detectable Warning Tiles: Set each detectable warning tile accurately and firmly in place with embedding anchors and fasteners attached, and firmly seat tile back in wet concrete by tamping or vibrating. Set surface of tile flush with surrounding concrete and adjacent tiles. Remove concrete from tile surfaces and clean tiles using methods recommended in writing by manufacturer.
- E. Surface-Applied Detectable Warning Tiles: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of tiles in amounts and pattern recommended by manufacturer, and set tiles in place. Install anchor devices through face of tiles and into pavement using anchors located as recommended by manufacturer. Apply sealant in continuous bead around perimeter of installation.

- F. Surface-Applied Detectable Warning Mats: Prepare existing paving surface by grinding and cleaning as recommended by manufacturer. Apply adhesive to back of mat and set mat in place. Firmly seat mat in adhesive bed. Install anchor devices through face of mat and into pavement using anchors located as recommended by manufacturer. Set heads of anchors flush with mat surface. Apply sealant in continuous bead around perimeter of mat.
- G. Remove and replace tactile warning surfacing that is broken or damaged or does not comply with requirements in this Section. Remove in complete sections from joint to joint unless otherwise approved by Architect. Replace using tactile warning surfacing installation methods acceptable to Architect.
- H. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material.

END OF SECTION 321726

SECTION 323113- CHAIN LINK VINYL COATED FENCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Furnish and install all chain link fencing and gates for the Dog Park

1.2 SUBMITTALS

- A. Changes in specifications may not be made after the bid date.
- B. Shop drawings: Layout of fences, gates with dimensions, details, and finishes of components, accessories, and post foundations.
- C. Product data: Manufacturer's catalog cuts indicating material compliance and specified options.
- D. Samples: If requested, samples of materials (e.g., fabric, wires, and accessories).

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Products from qualified manufacturers having a minimum of five years experience manufacturing thermally fused chain link fencing will be acceptable by the Owner's Representative as equal if they meet the following specifications for design, size gauge of metal parts and fabrication.

2.2 CHAIN LINK FENCE FABRIC

- A. Woven with nine (9) gauge steel wire or aluminized coated steel wire.
- B. Zinc coated steel fabric shall be galvanized after weaving and conform to ASTM-A-392. Galvanizing shall be 2.0 oz./s.f. minimum.
- C. Aluminum coated steel fabric shall conform to ASTM-A-428 and be 40 ounces per square foot minimum.
- D. Fabric to be woven in 2" mesh with top selvage knuckled and bottom selvage knuckled
- E. Fabric height as shown on the drawings.
- F. Fabric to have a 7 mil coating of Polyvinyl Chloride Bond to the fabric by utilizing the fusion method.
- G. The vinyl coating shall have a specific gravity of 1.34, be evenly applied and free of blisters. The bond between the vinyl coating and the steel fabric to be equal or greater than the cohesive strength of the vinyl.
- H. The minimum break strength of the coated fabric shall be 800 pounds.

- I. Selvage of fabric knuckled at bottom.

2.3 STEEL FENCE FRAMING

- A. Steel pipe - Type I: ASTM F 1083, standard weight schedule 40 and SS40: minimum yield strength of 25,000 psi (170 Mpa); sizes as indicated. Hot-dipped galvanized with minimum average 1.8 oz/ft² (550 g/m²) of coated surface area.
 - 1. Fence Height: 60 inches.
 - 2. Light Industrial-Strength Material: Group IC-L. round steel pipe, electric-resistance-welded pipe.
- B. End, Corner, and Pull Post 3" od Schedule 40 pipe weighing 5.79 per lineal feet.
 Line (intermediate) Post 2-1/2" od Schedule 40 pipe weighing 4.10 lbs per lineal feet.
 Rail and Braces 1-5/8" od 2.27 lbs/ft

2.4 CHAIN LINK SWING GATES

- A. Gate frames: Fabricate chain link swing gates in accordance with ASTM F 900 using galvanized steel tubular members, 2" round, weighing 2.72 lb/ft. Fusion or stainless steel welded connections forming rigid one-piece unit.
- B. Hardware materials: Hot dipped galvanized steel or malleable iron shapes to suit gate size.
- C. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180^o (3.14 rad) inward.
- D. Latch: Forked type capable of retaining gate in closed position and have provision for padlock. Latch shall permit operation from either side of gate.
- E. Keeper: Provide keeper for each gate leaf over 5' wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
- F. Double gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.
- G. Gate posts: Steel pipe ASTM F 1083 standard weight schedule 40; minimum yield strength of 25,000 psi (170 Mpa) or steel square sections (ASTM A 500, Grade B) having minimum yield strength of 40,000 psi (275) Mpa size as indicated. Hot-dipped galvanized with minimum 1.8 oz/ft² (550 kg/m²) of zinc or respective material finished in accordance with STM F 1043.

Gate leaf single width	Post Size (Square)	Weight
6 ft. or less	3 inch (3/16" wall)	5.1 lb/ft

- H. Brace and tension (stretcher bar) bands: Pressed steel. At square post provide tension bar clips.

- I. Tension (stretcher) bars: One piece lengths equal to 2 inches (50 mm) less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (4.76 mm x 19 mm) or equivalent fiber glass rod. Provide tension (stretcher) bars where chain link fabric meets terminal posts.
- J. Truss rods: Steel rods with minimum diameter of 5/16" (7.9 mm).
- K. Nuts and bolts are galvanized but not vinyl coated. Cans of PVC touch up paint will be used to color coat nuts and bolts.

2.5 SETTING MATERIALS

- A. Concrete: Minimum 28 day compressive strength of 3,000 psi (20 MPa).
- B. Drive Anchors: Galvanized angles, ASTM A 36 steel 1" x 1" x 30" (25 mm x 25 mm x 762 mm) galvanized shoe clamps to secure angles to posts.

2.6 PVC COLOR COATING

- A. All posts, rails, fabric, wires, braces, gates, and hardware used for dog park shall be PVC color coated: Black.
- B. PVC coating shall be applied to pipes and fittings by preheating the substrate, which has been cleaned and pretreated, having received a primer so as to thermally fuse and bond the PVC to the metal.
- C. Finished product shall be smooth, clean and free from visual bubbles or pits.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify areas to receive fencing are completed to final grades and elevations.
- B. Ensure property lines and legal boundaries of work are clearly established.

3.2 CHAIN LINK FENCE FRAMING INSTALLATION

- A. Install chain link fence in accordance with ASTM F 567 and manufacturer's instructions.
- B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.
- C. Space line posts uniformly at 10' on center or as indicated on the drawings.
- D. Concrete set all posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post. Slope to direct water away from posts.

- E. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.
- F. Bracing: Install horizontal pipe brace at mid-height for fences 6' and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.
- G. Top rail: Install lengths, 21'-0". Connect joints with sleeves for rigid connections for expansion/contraction.

3.3 CHAIN LINK FABRIC INSTALLATION

- A. Fabric: Install fabric on exterior side of dog park and attach so that fabric remains in tension after pulling force is released. Leave approximately 1" between finish grade and bottom selvage. Attach fabric with wire ties to line posts at 15" on center and to rails, braces, and bottom rail at 24" on center.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15" on center.

3.4 CHAIN LINK SWING GATE POST INSTALLATION

- A. Install gate posts in accordance with manufacturer's instructions.
- B. Concrete set gate posts: Drill holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately 6" deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36" below surface when in firm, undisturbed soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts.
 - 1. Gate posts and hardware: Set keeper, stops, sleeves into concrete. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.

3.5 GATE INSTALLATION

- A. Install gates plumb, level, and secure for full opening without interference.
- B. Attach hardware by means which will prevent unauthorized removal.
- C. Adjust hardware for smooth operation.

3.6 ACCESSORIES

- A. Chain link fence accessories: Provide items required to complete fence system. Galvanized each ferrous metal item and finish to match framing.
- B. Post caps: Formed steel, cast malleable iron, or aluminum alloy weathertight closure cap for tubular posts. Provide one cap for each post. Cap to have provision for barbed wire when necessary. (Where top rail is used, provide tops to permit passage of top rail.)

- C. Top rail and brace rail ends: Formed steel, malleable or cast iron, for connection of rail and brace to terminal posts.
- D. Top rail sleeves: 6" sleeve allowing for expansion and contraction of top rail.
- E. Wire ties: 9 gauge 0.148" galvanized steel wire for attachment of fabric to line posts. Double wrap 13 gauge 0.092" for rails and braces. Hog ring ties of 12-1/2 gauge 0.0985" for attachment of fabric to tension wire.
- F. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.
- G. Fasteners: Install nuts on side of fence opposite fabric side for added security.

3.7 CLEANING

- A. Clean up debris and unused material and remove from the site.

END OF SECTION

SECTION 329200 - SEEDING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

1.2 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- I. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed.
 - 1. Certification of seed mixture.
- B. Product certificates.

1.5 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 1. Pesticide Applicator: State licensed, commercial.
- B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - 1. The soil-testing laboratory shall oversee soil sampling.
 - 2. Report suitability of tested soil for turf growth.
 - a. State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - b. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

1.7 MAINTENANCE SERVICE

- A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
 - 1. Seeded Turf: 60 days from date of planting completion.
 - a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Grass Seed Mix: Proprietary seed mix as follows:
 - 1. All disturbed areas shall be seeded with the following 80-10-1-0 blend.: :
 - a. 40% Grande II Turf Type Tall Fescue
 - b. 20% Falcon IV Turf Type Fescue
 - c. 20% Cochise III Turf Type Tall Fescue
 - d. 10% Award Kentucky Bluegrass
 - e. 10% Pizzazz Perennial Ryegrass
 - 2. Sow seed at the rate of 10 pounds per 1,000 square feet.
 - 3. Contractor shall verify in written communication to the Owner the exact amount of seed sowed.

2.2 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: Triple 19 - 5 lb/1000 sq. ft. of 19 percent nitrogen, 19 percent phosphorous, and 19 percent potassium, by weight.

2.3 PLANTING SOILS

- A. Planting Soil: ASTM D 5268 topsoil with a minimum of 2 percent organic material content. Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process. Existing, in-place surface soil. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

- C. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.

2.5 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Reduce elevation of planting soil to allow for soil thickness of sod.
 - 2. Apply fertilizer directly to subgrade before loosening.
 - 3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
 - 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.
- B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

- A. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 7 lb/1000 sq. ft..
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

- D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- E. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.3 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.4 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:
 - 1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
 - 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 333000 - SANITARY SEWERAGE UTILITIES**PART 1 - GENERAL**

- 1.1 This work shall consist of the installation of sanitary sewer lines in accordance with these specifications and in reasonable close conformity with the lines and grades shown on the plans or as established by the Engineer.

PART 2 - PRODUCTS

- 2.1 The materials used in this construction shall be the type shown on the plans or as directed by the Engineer and shall conform to the following requirements:
- A. P.V.C. Pipe
 - 1. Polyvinylchloride (PVC) pipe shall be ASTM D3033 or 3034 with ASTM D3212 joints.
 - B. Steel Casing Pipe
 - 1. Where steel casing pipe is required, it shall meet the requirements of AWWA C202 of these Specifications.
 - C. Crushed Stone for Bedding
 - 1. Bedding material shall be as per the drawings.
 - D. Manholes
 - 1. Manholes shall be constructed using one of the following materials:
 - a. Pre-cast reinforced concrete manholes shall meet requirements of ODOT in accordance with the detail drawings. ASTM C478 w/ASTM C443 Joints.
 - b. Drop manhole shall be in accordance with the detail drawings.
 - E. Manhole Frames, Covers, Steps, Cleanout Frames and Covers
 - 1. Manhole frames and covers shall be roadway type with deep socket covers. Machine frames and covers to prevent rattling. Castings shall be of gray iron meeting requirements of ASTM A48, Class 35, covers shall have a combined weight of not less than 325 pounds for out of traffic locations and 425 pounds for traffic locations. Frame height shall be not less than 7". Covers shall have one pick hole only, about 1-1/2 inches wide and 1/2 inch deep with 3/8 inch square undercut at rear and 3/4 inch square undercut on sides, and the cover shall have the work "sanitary sewer" cast in it in accordance with the drawings.

2. Waterproof manhole frames and covers shall have bolt holes for anchor bolts. These manholes shall have the joint between the frame and the precast section sealed with Thickol, on part of Polysulfide base sealant, or an approved equal. The Contractor shall furnish waterproof frames and covers and they shall be per the drawings.
3. Cleanout frame and covers shall be of gray iron meeting requirements of ASTM A48, Class 30.

PART 3 - EXECUTION

3.1 CLEARING AND GRUBBING

- A. The Contractor shall clear and grub the surface as required for the full length of the trench. The Contractor shall dispose of all trees, shrubs and refuse in a satisfactory manner. All surface materials covering the location of trenches.

3.2 TRENCHING

- A. The trench shall be excavated to conform to the drawings. Where the sewer is in an existing paved area, the edges of the pavement for the ditch shall be cut in a straight line, parallel to the pipe on each side. A straight and vertical cut shall be made either prior to excavation or after, but before installation of the permanent pavement repair.
- B. All trenching shall be open-cut from the surface and no tunneling will be allowed without the consent of the Engineer. All trenches shall be excavated to the lines and grades as shown on the plans. The Engineer will furnish these lines and grades on the ground at the beginning of the job.
- C. The bottom of the trench shall be excavated to the width on the drawings. The sides of the trench shall be uniform and vertical. Care shall be taken not to over excavate on the trenches.
- D. All trenches excavated below grade shall be refilled to grade with gravel. No extra compensation shall be allowed for this work unless such excavation is ordered by the Engineer.
- E. All trenches will be excavated so as to accommodate the proper bedding material as shown in the standard drawings in these Specifications. No extra compensation will be made for crushed stone used to bring the trench up to grade.
- F. The Contractor shall not, without written permission from the Engineer, open more than three hundred (300) ft. of trench in advance of the completed sewer, and the completed backfilling and restoration of the trench to a satisfactory condition. If the Contractor fails to heed the above requirements, the Engineer will refuse payment until these requirements are complied with.
- G. All drains, gutters, culverts and sewers for surface drainage are to be kept opened or if unavoidably closed, other provisions are to be made for this drainage. All crossings,

culverts or ditches are to be made without extra compensation to the Contractor beyond the extra price of sewer laid.

- H. The Contractor shall be required to furnish, put-in-place, and maintain such sheeting, bracing, etc., as may be required to support the sides of the trenches.
- I. In excavating for the trench it is essential that the trench bottom be uniform in grade and remain static during backfilling and under all subsequent trench conditions. To insure a uniform depth of stone, the grade of the bottom of the trench shall be graded to within 5/10 of one inch of the plan grade. The stone shall be graded to the same tolerances.
- J. The Contractor shall pump, or otherwise remove any water that accumulates in the trenches and shall perform all work necessary to keep the trenches clear from water while the pipe is being laid or masonry units are being constructed. No structure or sewer pipe shall be constructed in water and water shall not be allowed to flow over or rise upon any concrete masonry structure or sewer pipe until the work has been accepted.
- K. All water pumped or bailed from the trench or other excavation shall be conveyed in a proper manner to a suitable point of discharge.

3.3 DISPOSITION OF EXCAVATED MATERIAL

- A. All excavated material shall be placed on one side of the trench unless permission is given by the Engineer or his representative to place it on both sides.
- B. Excavated materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire alarm boxes, fire hydrants and gate valves on water pipes, which are located in the vicinity.
- C. Excavated material shall be placed so as to inconvenience the public as little as possible.
- D. All fences and walls shall be protected, and if damaged, shall be repaired or replaced in as good condition as before disturbed. All shade trees shall be protected.

3.4 SUB-SURFACE OBSTRUCTION

- A. In excavating, backfilling and laying pipe, care must be taken not to remove or injure any sub-surface structure such as water lines, sewer lines, conduits, etc. If necessary, the Contractor shall, at his own expense, sling, shore-up and maintain a continuous flow in said structure until final acceptance of the work.
- B. In the event that a gas line, water line, power cable or conduit, or telephone cable or conduit is broken or damaged, the Contractor shall give immediate notice to the proper authorities and shall be responsible for any damage to persons or property caused by such breaks.
- C. If a service pipe supplying water or gas to an adjoining house is broken, the Contractor shall repair same at once and at his own expense. The City may, at the Contractor's expense, repair any such service without prior notice to the Contractor. Should it become

necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on a force account basis.

3.5 BEDDING FOR THE PIPE

- A. Wherever the pipe is laid below the existing ground level, bedding material meeting the specifications in Section B. shall be placed under the pipe in accordance with the details shown on the drawings.
- B. To insure full support of the pipe barrel, bell holes must be in the stone. The stone shall be hand shaped to conform to the barrel of the pipe.
- C. In accordance with the details of the drawings, loose backfill shall be carefully compacted around and over the pipe to a height of twelve (12) inches above the top of the pipe.

3.6 PIPE LAYING

- A. The Contractor shall comply with Kentucky Division of Water standards for separation of sewer lines from water lines and/or combined sewers.
- B. Prior to being installed, each section of the pipe shall be carefully examined for damages and conformation to these specifications. All pipe damaged or deemed not to conform to these specifications shall be rejected. The faces of all spigots and bells cannot be made to fit properly, or pipe, which has chipped bells or spigots will be rejected. The faces of all spigots ends and of all shoulders on the bells must be true, and be brought in fair contact. All lumps on the face will be cut away before the pipe is lowered into the trench.
- C. The pipe and special fittings shall be laid in the trench so that its interior surface shall conform to the grade and alignment as given by the Engineer. Pipe laying shall be done so as to disturb as little as possible the pipe already laid, and unless otherwise directed by the Engineer, the pipe shall be laid up hill without any break in line or grade from manhole to manhole. Before laying, the bell and spigot shall be wiped free from any dirt and other foreign material and a coating of pipe lubricant applied in accordance with manufacturer's recommendations.
- D. Installation of all pipe shall be observed by the City Engineer for the City of Greensburg prior to backfilling and a suitable ladder affording easy and safe access for such inspection shall be furnished. When the trench is left for the night or the pipe laying is suspended, the ends of the pipe shall be covered to keep out dirt and other foreign substances.
- E. All special fittings, such as wyes, tees and building connections shall be installed at the point indicated by the Engineer or as shown on the plans in accordance with details.

3.7 CONDITION OF AN OPEN TRENCH AFTER WORK

- A. Whenever it becomes necessary to leave a section of trench open after the completion of the day's work, the Contractor shall be responsible for:

1. Constructing necessary barricades, lights, etc. to protect the public.
2. Providing the necessary drainage to keep the trench free from water and sewage.
3. Pumping or bailing any water that accumulates in the trenches.
4. Undercutting any portion of the trench that becomes saturated with water.

3.8 BACKFILL

- A. The trench shall be backfilled per the drawings. Backfill shall be placed by hand, uniformly on each side of the pipe and spaded. Do not backfill on muddy or frozen soil. Backfill trench from one (1) foot above the pipe to grade with clean earth fill free of stones larger than six (6) inches. Layers shall not exceed 12 inches, except that under road shoulders and under existing or future paved areas, layers shall not exceed eight (8) inches. Backfill shall be compacted to the density specified for the areas in which it is located except that minimum compaction in any area shall be to the density of the adjacent soil. Place backfill materials evenly adjacent to structures. Take care to prevent wedging action of the backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift. The Contractor shall refill all excavations as rapidly as practical after completion of the structural work therein, or after the excavation have served their purpose. All trenches shall be backfilled prior to the completion of the day's work unless otherwise directed by the Engineer.
- B. The Contractor shall compact each layer of fill or backfill to not less than 98 percent maximum density beneath existing or future pavements, walks, and road shoulders and 90 percent maximum density at optimum, moisture content in other unpaved areas as determined by ASTM D698 (AASHTO T-99). Solid shall be compacted using equipment suitable for the material and the work area location. Power driven hand tampers shall be used for compacting material adjacent to structures. Use hand tamper for recompaction over underground utilities.
- C. All areas within the limits designated on the drawings, including adjacent transition areas shall be uniformly graded. The contractor shall finish surfaces within specified tolerances with uniform levels or slopes between points where elevations are shown and existing grades. Specified tolerances shall be as follows:
 1. Finish sub-grade areas that are to receive topsoil to within 0.10 foot of required sub-grade elevations.
 2. Shape sub-grade under walks to line, grade, and cross-section to within 0.10 foot of required sub-grade elevations.
 3. Shape sub-grade under pavement to line, grade, and cross-section to within 1/2 inch of required sub-grade elevations.
- D. The Contractor shall protect newly graded areas from traffic and erosion and repair and re-establish grade in settled, eroded, or rutted areas. Where compacted areas are disturbed by subsequent construction or adverse weather, he shall scarify the surface,

reshape and compact to the required density. If the Contractor shall fail to maintain any trench within two (2) days after receipt of written notice from the Engineer, the Owner may refill the said depressions and the cost of such work may be retained from monies due to the Contractor. In case of emergency, the Owner may refill any dangerous depressions without giving previous notice to the Contractor.

3.9 MANHOLES

- A. Precast manholes shall be constructed in accordance with these specifications.
- B. The Contractor shall use a flexible boot for making sealed joints from pipe to manhole.
 - 1. The port shall be cored to the size, shape, surface finish, and location required and not cast in the manhole. Angular adjustments thru 20 degrees shall be allowed. The flexible boot shall be a 3/8-inch thick neoprene compound meeting ASTM C443 Specifications. The boot shall be secured to the port with an internal aluminum expanding band and to the pipe with a non-magnetic corrosion resistant steel external band. Boot seal shall be "Kor-N-Seal" as manufactured by National Pollution Control Systems, Inc. or equal.

3.10 MANHOLE AND CLEANOUT FRAMES AND COVERS

- A. The Contractor is to furnish the frames and covers. They must be coordinated with the City standards.

3.11 DROP MANHOLES

- A. Drop manholes shall be constructed in accordance with detail drawings.

3.12 CLEANUP AND RESTORATION OF SITE

- A. After the backfilling is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site, and shall keep the site free of mud and dust to the satisfaction of the Engineer. The Contractor may be required to flush or sprinkle the street to prevent dust nuisance. It is important that cleanup and restoration of the site follow the work closely. The Contractor shall dispose of surplus material and clean the street at the end of each week for portion of work completed that week unless additional cleaning is required. After all work is completed the Contractor shall remove all tools and other equipment, leaving the site free, clean and in good condition. The Contractor shall keep the surface over and along the trenches and other excavation in a safe and satisfactory condition during the progress of the work and for a period of one (1) year after the work has been completed. He shall be held responsible for any accidents that may occur on the account of the defective condition of such surface.

3.13 FINAL INSPECTION AND TESTING

- A. Upon completion of the entire work, the Engineer may inspect the work in part or as a whole and make such test as will satisfy himself that every portion of the contract has been faithfully carried out. Pipe lines from manhole to manhole shall show a round circle

of light from one end to the other. Any obstructions found in the sewer shall be removed and the sewer barrel left clean for its entire length.

- B. All manholes shall be of the specified size, shape and material, and shall have their tops set to the grade as furnished by the Engineer.
- C. If, in the opinion of the Engineer, a defect exists in the pipe line or its appurtenances, in some place not accessible except by uncovering, the Engineer may order the line to be uncovered. If it is found that after the pipe has been uncovered at the order of the Engineer, no defect exists or that the defect was not the fault of the Contractor, then the expense so incurred by the Contractor shall be borne by the Owner.
- D. The Contractor shall provide all equipment, materials, water, labor, etc. needed to perform test in accordance with procedure listed below. All equipment, materials, etc. used shall be checked and approved by the Engineer prior to its use. It shall be the responsibility of the Contractor to insure the pipe is clean before any tests are made.
- E. Test for leakage of gravity sewer shall be done as directed by the Engineer or as shown on the plans. Infiltration and exfiltration test may be used and low pressure air test may be used for sewer up to 12 inches in diameter.

1. Exfiltration and Infiltration Test

- a. The Contractor shall perform water exfiltration and infiltration leakage test in the presence of the Engineer after the lines are completed and backfilled. The leakage outward or inward (exfiltration or infiltration) shall not exceed 200 gallons per inch of nominal pipe diameter per mile per day for any section of system including manholes.
- b. Where exfiltration is tested from the line shall be subjected to a minimum of 4 ft. of head, or head to the top of manhole, whichever is lesser, above the crown of the pipe at the upstream manhole of the section being tested.
- c. The infiltration test shall be used only when the hydrostatic head outside the pipe is a minimum of 4 ft. above the crown of the pipe for the entire length of the pipe being tested.
- d. Plug the pipe at the lower manhole. Fill the line and manhole to 4 ft. level, or top of straight section of less than 4 ft. Let the water stand until pipe has reached maximum absorption and until all trapped air has escaped, 4 hours minimum. After maximum absorption is reached, refill manhole to original level. After 30 minutes, record difference in level and convert to gallons. Subtract manhole loss to obtain pipe line loss. Manhole loss is found by plugging inlet and outlet and filling manhole with water to 4 foot level to top of straight section if less than 4 ft. Let water stand one hour to reach maximum absorption. Refill to original level. After 30 minutes, check difference in level and convert to gallons.

- e. If line fails to meet the maximum allowable leakage requirements, the Contractor shall locate and repair deficiencies and rerun test until the line meets these requirements. Contract time extensions will not be allowed to correct deficiencies found during line acceptance testing. The Contractor shall obtain personnel skilled in running test and evaluating results. The Engineer will only observe tests and certify the results.

2. Low Pressure Air Test

- a. Low pressure air test when approved by the Engineer shall conform to ASTM C828-75T.
- b. Before tests are made all wyes, tees, or end of side sewer stubs shall be plugged with flexible-joint caps. or acceptable alternate, securely fastened to withstand the internal test pressure. Such plugs or caps shall be readily removable, and their removal shall provide a socket suitable for making a flexible-joint lateral connection or extension.
- c. After all pipes are cleaned, air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.
- d. The pipe line shall be considered acceptable, when tested at an average pressure of 3.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe, it: (1) the total rate of air loss from any section tested in its entirety between manhole and cleanout structures does not exceed 2.0 cubic feet per minute, or (2) the section under test does not lose air at a rate greater than 0.0030 cubic feet per minute per square foot of internal pipe surface.
- e. The requirements of this specification shall be considered satisfied is the time required in seconds for the pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe is not less than that computed according to the attached page entitled, "Procedure for Conducting Low Pressure Air Test."
- f. If the pipe installations fail to meet these requirements, the Contractor shall determine at his own expense the source or sources of leakage, and he shall repair (if the extent and type of repairs proposed by the Contractor appear reasonable to the Engineer) or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this test, or the alternative water exfiltration test, before being considered acceptable.

3. Mandrel Testing

- a. Conduct for all pipes under 30 inches in diameter and provide project completion reports witnessed by local authorities having jurisdiction or the Owner's testing agency.
 - b. Install and backfill pipe runs to subgrade elevation (preferably to final grade elevation) at least 30 days prior to mandrel testing.
 - c. Pipe deflection shall not exceed 5% of average inside diameter as established by ASTM Standards
 - d. Approved mandrel must conform to applicable ASTM Standards
 - e. Flush and clean lines prior to utilizing a 5-point mandrel of a size not less than 92.5 percent of the pipe diameter.
 - f. Remove and replace pipe exceeding deflection limits.
4. Vacuum Testing of Manholes
- a. Conduct for all manholes and provide project completion reports witnessed by local authorities having jurisdiction.
 - b. Vacuum testing shall be done per ASTM C1244, Standard Test Methods for Concrete Sewer Manholes by the Negative Air Pressure Test Prior to Backfill.
 - c. Vacuum testing is to be done prior to backfilling and no groundwater shall be present in the excavation.
 - d. Manholes shall be tested before the ring and cover and grade adjustment rings have been installed. All pipes entering the manhole shall be plugged and braced and a vacuum of ten inches of mercury shall be drawn. The vacuum pump shall be turned off and the time monitored as the vacuum drops one inch. The vacuum must not drop more than one inch for the duration of the time indicated, 1 minute for 48" diameter, 1:15 for 60" and 1:30 for 72" diameter.
 - e. Manholes, which fail the vacuum test, shall have the defects located and repaired and the test shall be repeated. Repair and repeat testing shall be continued until the testing requirements are met.

END OF SECTION

SECTION 334100 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Cleanouts.
3. Area Drains.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:

1. Manholes: Include plans, elevations, sections, details, frames, and covers.
2. Catch basins. Include plans, elevations, sections, details, frames, covers, and grates.

1.3 SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.

1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.

B. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.

1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

2.2 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Light Duty, Medium Duty, Heavy Duty, and Extra-Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.3 AREA DRAINS

- ### A. Area Drains 6" Square Grate with Styrene Adapter equal to NDS PRO #921B.

PART 3 - EXECUTION

3.1 EARTHWORK

- #### A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- #### A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- #### B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- #### C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- #### D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- #### E. Install gravity-flow, nonpressure drainage piping according to the following:
1. Install piping pitched down in direction of flow.
 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 3. Install piping with 36-inch minimum cover.
 4. Install PE corrugated sewer piping according to ASTM D 2321.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 1. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
 2. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 AREA DRAIN INSTALLATION

- A. Set frames and grates to elevations indicated.

3.6 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 221413 "Facility Storm Drainage Piping."
- B. Make connections to existing piping and underground manholes.
 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an

opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

- a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.8 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use warning tape or detectable warning tape over ferrous piping.
 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.9 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate reports for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
 - b. Option: Test plastic piping according to ASTM F 1417.
 - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 334100

SECTION 334600 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Perforated-wall pipe and fittings.
 - 2. Geotextile filter fabrics.

1.2 ACTION SUBMITTALS

- A. Product Data: For geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

2.2 SOIL MATERIALS

- A. Soil materials are specified in Section 312000 "Earth Moving."

2.3 WATERPROOFING FELTS

- A. Material: Comply with ASTM D 226, Type I, asphalt or ASTM D 227, coal-tar-saturated organic felt.

2.4 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
 - 1. Survivability: AASHTO M 288 Class 2.
 - 2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.3 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.

- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

3.4 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Foundation Subdrainage: Install piping level and with a minimum cover of 36 inches unless otherwise indicated.
 - 2. Underslab Subdrainage: Install piping level.
 - 3. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.
 - 4. Lay perforated pipe with perforations down.
 - 5. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D 2321.

3.5 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.6 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for Foundation Subdrainage:

1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above grade.
4. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."

C. Cleanouts for Underslab Subdrainage:

1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.7 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.8 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

B. Drain piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.9 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600