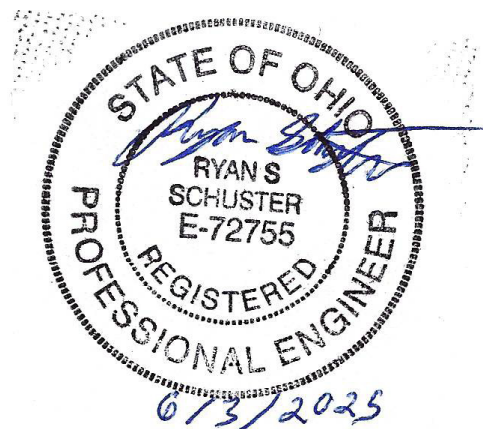


**Lakeshore East Equalization Basin
Phase 2**

City of Willoughby

**WPCLF Funded Project
&
CDS/EPA Community Grant
Funded Project**

October 2025



230264PH2

CITY OF WILLOUGHBY OFFICIALS

ADMINISTRATION

Robert A. Fiala, Mayor

Michael Lucas, Director of Law

Cher Hoffman, Director of Finance

Rich Palmisano, Director of Public Service

Judean Keller, Director of Parks and Recreation

COUNCIL

Robert E. Carr, Ward 4, Council President

John Tomaselli, Ward 3, Council Vice President

Kristie Sievers, Ward 1

Ken J. Kary, Ward 2

Mike L. Merhar, Ward 5

Daniel J. Garry, Ward 6

Daniel J. Anderson, Councilman-at-Large

Alisa Novak, Clerk of Council

ADVERTISEMENT FOR BIDS/PUBLIC NOTICE TO BIDDERS

Sealed bids will be received at the office of the Service Director at Willoughby City Hall, 1 Public Square, Willoughby, Ohio 44094 until 12:00 p.m. on October 31, 2025 and will be opened and read immediately thereafter for the

LAKESHORE EAST EQUALIZATION BASIN PHASE 2

WPCLF FUNDED PROJECT & CDS/EPA COMMUNITY GRANT FUNDED PROJECT

OPINION OF PROBABLE CONSTRUCTION COST: \$11,300,000.00

**COMPLETION DATES:
SUBSTANTIAL COMPLETION - 441 DAYS FROM NOTICE TO PROCEED
FINAL COMPLETION - 471 DAYS FROM NOTICE TO PROCEED**

The bid specifications, drawings, plan holders list, addenda, and other bid information (**but not the bid forms**) may be viewed and/or downloaded for free via the internet at <https://bids.verdantas.com>. The bidder shall be responsible to check for Addenda and obtain same from the web site.

Bids must be in accordance with drawings and specifications and on forms available from CT Consultants, Inc. at a non-refundable cost of One Hundred and Seventy-Five Dollars (\$175.00) for hard copies **and \$45.00 for electronic files**. Documents may be ordered by registering and paying online at <https://bids.verdantas.com>. Please contact planroom@verdantas.com or call (440) 530-2351 if you encounter any problems viewing, registering or paying for the documents.

There will be a Non-Mandatory Pre-Bid Conference on October 14, at 10:00 a.m. at the office of the Service Director at Willoughby City Hall, 1 Public Square, Willoughby, Ohio 44094.

This project will be funded by the Water Pollution Control Loan Fund Program as administered by the Ohio Environmental Protection Agency and the Ohio Water Development Authority. The Contractor shall note that there are Disadvantaged Business Enterprise participation goals for this project.

This procurement is subject to the EPA policy on encouraging the participation of small business in rural areas (SBRAs).

Build America, Buy America Act (BABA) requirements.

Publish: *News Herald*
October 3, 2025
October 10, 2025

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SECTION 1
BID DOCUMENTS

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

- 1.1 Sealed bids shall be received by the Owner at the location specified and until the time and date specified in the Advertisement for Bids/Public Notice to Bidders.
- 1.2 Each bid shall contain the full name and address of each person or company interested in said bid. If no other person be so interested, the Bidder shall distinctly so state the fact.
- 1.3 Bid forms must be completed in ink or by typewriter. Any corrections to the bid forms prior to submission must be initialed by the person signing the bid. Failure to submit any bid form(s) or other required document(s) may be cause for rejection of the bidder's bid at the sole discretion of the Owner.
- 1.4 Bids by Corporations must be executed in the corporate name by the President, Vice President, or other officer accompanied by evidence of authority to sign and the corporate seal must be affixed and attested by the Secretary on the Corporate Resolution form.
- 1.5 Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature.
- 1.6 All names must be typed or printed below the signature.
- 1.7 The bid shall contain an acknowledgment of receipt of all Addenda.
- 1.8 If a Bidder wishes to withdraw their bid prior to the opening of bids, they shall state their purpose in writing to the Owner before the time fixed for the opening, and when reached it shall be handed to them unread.
- 1.9 After the opening of bids, no Bidder may withdraw their bid for a period of **120 days**.

PART 2 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- 2.1 Before submitting a bid, each Bidder must
 - A. Examine the Contract Documents thoroughly.
 - B. Visit the site to familiarize themselves with local conditions that may in any manner affect cost, progress, or performance of the work.
 - C. Familiarize themselves with Federal, State, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, or performance of the work.
 - D. Study and carefully correlate Bidder's observations with the Contract Documents.

- 2.2 Reference is made to the Specific Project Requirements for the identification of any reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the work which have been relied upon by the Engineer in preparing the drawings and specifications. Owner will make copies of such reports available to any Bidder requesting them if not made available with the bid documents. These reports are not guaranteed as to accuracy or completeness; nor are they part of the Contract Documents. Before submitting their bid each Bidder will, at their own expense, make such additional investigations and tests as the Bidder may deem necessary to determine their bid for performance of the work in accordance with the time, price and other terms and conditions of the Contract Documents.
- 2.3 Upon request, the Owner will provide each Bidder access to the site to conduct such reasonable investigations and tests as each Bidder deems necessary for submission for their bid.
- 2.4 The lands upon which the work is to be performed, rights-of-way for access thereto, and other lands designated for use by Bidder in performing the work are identified on the Drawings.
- 2.5 The submission of a bid will constitute an incontrovertible representation by the Bidder that they have complied with every requirement of this section and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work.

PART 3 ESTIMATED QUANTITIES

- 3.1 In Unit Price Contracts, the quantities of the work itemized in the bid are approximate only and the bidders are hereby notified that the estimated quantities made by the Engineer are merely for the guidance of the Owner in comparing on a uniform basis all bids received for the work.
- 3.2 The contract quantities, where itemized, are based on plan horizontal and vertical dimensions unless otherwise specified. It is the Contractor's responsibility to verify and determine actual quantities of materials such as pipe, pavement, subgrade, etc. in their ordering materials.
- 3.3 Payments, except for lump sum contracts and except for lump sum items in unit price contracts, will be made to the Contractor only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications.
- 3.4 The successful Bidder will be required to furnish the Owner with a complete breakdown of the lump sum bid items, to the satisfaction of the Engineer/Architect, before signing the Contract documents.

PART 4 CONTRACTOR'S QUALIFICATION

- 4.1 Bidder shall provide detailed information relating to similar projects completed within the past 5 years which demonstrates the bidder's capability, responsibility, experience, skill, and financial standing to undertake this type of project and shall include a list of all projects currently under construction including status and contact person.
- 4.2 Bidder shall own, have rental or lease agreements for, or otherwise have readily available any and all equipment and tools necessary for proper execution of the work. The Owner reserves the right to request lists of equipment or tools available for the project including sources.
- 4.3 Bidder shall provide pertinent information to the Owner relative to any pending suits or outstanding liens. If no information is provided by the Bidder, the Owner shall assume that any such suits or liens do not exist.
- 4.4 The Owner may require similar information on any or all subcontractors proposed by the Bidder.
- 4.5 Bids of corporations not chartered in the state in which the work will take place must be accompanied by proper certification that the corporation is authorized to do business in that state.

PART 5 SUBCONTRACTORS

- 5.1 The Bidder shall state on the appropriate bid form the names of all Subcontractors, Sub Consultants and other professional service providers proposed and the items of work they are to be assigned. All work not assigned to a Subcontractor shall be assumed by the Owner to be performed by the Bidder.
- 5.2 The Owner reserves the right to approve all subcontractors proposed by the Bidder. If the Owner, after due investigation, rejects the use of a proposed subcontractor, the apparent successful Bidder may either submit an acceptable substitution without increase in bid price or decline substitution and withdraw their bid without sacrificing their bid security. Any listed subcontractor to whom the Owner does not make written objection prior to award of contract, shall be deemed acceptable to the Owner.
- 5.3 Requests for changes of Subcontractor by the Bidder after the award shall be subject to the Owner's approval and shall not change the contract bid prices.
- 5.4 No contractor shall be required to employ any Subcontractor, person or organization against whom they have reasonable objection.

PART 6 BID REVIEW BY OWNER

- 6.1 The Owner reserves the right to reject any and all bids, to waive as an informality any and all irregularities, and to disregard all nonconforming, nonresponsive or conditional bids.

- 6.2 All extensions and totals of unit prices and quantities submitted as part of the bid shall be considered informal until verified by the Owner. All bids must be made on the forms contained herein and the bid prices must be written therein, in figures only. Unit prices shall be separately written for "Unit Price Labor," "Unit Price Material," and "Total Unit Price" for each item listed. Should an error in addition and/or multiplication be determined while checking the Contractor's math and verifying their total bid, the "Unit Price Labor" and the "Unit Price Material" figures shall govern in determining the correct "Total Unit Price" and the correct "Item Total."
- 6.3 Each bidder must bid on all Items, Alternates, Deductions, and Additions contained in the Bidding Forms. All bids not in conformity with this notice may be considered non-responsive and may be rejected.
- 6.4 More than one bid for the same work from an individual or entity under the same of different names will not be considered. Reasonable grounds for believing that any bidder has an interest in more than one bid for the work may be cause for disqualification of that bidder and the rejection of all bids in which the bidder has an interest. A subcontractor or supplier is not a bidder, and may submit prices to multiple bidders.
- 6.5 In evaluating bids, the Owner may consider:
- A. The qualifications and experience of the Bidder, proposed subcontractors, and principal material suppliers as outlined in the plans and specifications.
 - B. Financial ability and soundness of the Bidder and proposed subcontractors.
 - C. Completeness of all bid forms and bid requirements.
 - D. Alternates and unit prices requested in the Bid Forms.
 - E. Unit prices or schedules of values that are or appear to be unbalanced.
 - F. Previous contractual experience with the Owner.
 - G. Whether or not the bid package complies with the prescribed requirements.
 - H. The proposed completion date, if applicable.
 - I. Any other matter allowed by law or local ordinance or resolution.
- 6.6 Owner may conduct further investigations as they deem necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications, and financial ability of the Bidder, proposed Subcontractors, and other persons and organizations to do the work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.
- 6.7 Owner reserves the right to reject the bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

- 6.8 The Contract award shall be based on the lowest and best bid or lowest responsive and responsible bid (as applicable for the public contracting agency receiving bids) for the base bid and selected alternate items (if any) for this project.

PART 7 BID SECURITY

- 7.1 Each bid must be accompanied by a certified or cashier's check in the amount of 10% of the amount bid, an irrevocable letter of credit in the amount of 10% of the amount bid or an original bond in the amount of 100% of the amount bid per ORC 153.54 and 153.571. The certified or cashier's check, or irrevocable letter of credit shall be from a financial institution authorized to transact business in the State of Ohio and acceptable to the Owner. The bond shall be underwritten by a Surety Company authorized to transact business in the State of Ohio having an Ohio agent and listed on the most current Department of the Treasury Circular 570, "Surety Companies Acceptable on Federal Bonds." The bond shall be a "Bid Guarantee and Contract Bond" ("rollover bond") per O.R.C. sections 153.54 and 153.571 submitted for the full amount of the bid **including all alternates**, if any.

If bid security is made by bond, the Bidder and their Surety shall sign the Supplemental Bond Acknowledgement form and submit with their bid.

- 7.2 The certified or cashier's check, irrevocable letter of credit, or bond shall be made payable to the Owner and shall serve as a guarantee that in the event the bid is accepted and a contract is awarded to the successful Bidder, the contract will be executed by the bidder including any certifications, certificates or additional bonds required by the contract.
- 7.3 Failure on the part of the successful Bidder to execute the contract documents will cause the certified or cashier's check, irrevocable letter of credit, or bond to be forfeited to the Owner as damages.
- A. If the Owner awards the contract without rebidding, the Bidder (and the Surety on their bond if a bond was submitted) shall be liable to the Owner for a penal sum not to exceed the difference between the low bid and the next lowest bidder or 10% of the amount of the bid, whichever is less.
- B. If the Owner does not award the Contract to the next lowest Bidder, but resubmits the project for bidding; the Bidder (and the Surety on their bond if a bond was submitted) shall be liable to the Owner for a penal sum not to exceed the costs in connection with the resubmission of bids or 10% of the amount of the bid, whichever is less.
- 7.4 Checks or letters of credit for bid security of all bidders will be returned in the manner and timeframe stipulated in the Ohio Revised Code.

PART 8 CONTRACT BOND

- 8.1 As security for faithful performance and payment of all obligations under the Contract, the Owner shall require and the successful Bidder shall furnish either:
- A. *If submitted as Bid Security at time of bid:* "Bid Guarantee and Contract Bond" (AKA "rollover bond") per O.R.C. sections 153.54 and 153.571.
 - B. *If a cashier's check or irrevocable letter of credit is submitted as Bid Security at time of bid:* Contract Bond per Ohio Revised Code Sections 153.54 and 153.57, in the amount of 100% of the Contract Price. The Contractor and their Surety shall sign the Supplemental Bond Acknowledgement form and submit with the Contract forms
- 8.2 The bond shall be underwritten by a Surety Company authorized to transact business in the State of Ohio having an Ohio agent and listed on the most current Department of the Treasury Circular 570, "Surety Companies Acceptable on Federal Bonds."
- 8.3 The contract bond shall cover correction of the work for the period stated in the specifications and the correction period shall start upon Final Acceptance of the entire project and final payment by the Owner.
- 8.4 Nothing in the performance of the Engineer's service to the Owner in connection with this project shall in any way imply any undertaking for the benefit of the successful Bidder, its subcontractor(s), or the surety of any of them.

PART 9 AWARD AND EXECUTION OF CONTRACT

- 9.1 After the Owner's legislative body awards the project, the successful bidder will receive the unsigned contract documents. Within 10 days after their receipt, the successful Bidder shall sign and deliver to the Owner said contract documents including any certifications, certificates, or additional bonds required by the contract.
- 9.2 The Owner shall execute the Contract within **120 days** after the day of the bid opening. When necessary and by mutual consent between the Owner and the Successful Bidder, this **120-day** period may be extended.
- 9.3 The date of the Owner's signature on the Contract Agreement shall be the effective contract date.
- 9.4 The Owner shall execute and deliver to the successful Bidder one set of fully executed contract documents.

PART 10 INSURANCE

- 10.1 Verification of limits for public liability, property damage, automobile, Worker's Compensation, or any other insurance required by the provisions of this Contract must be submitted to the Owner prior to execution of the Contract.

- 10.2 All insurance shall be endorsed so that it cannot be cancelled for non-payment of premium for 10 days or cancelled or non-renewed for any other reason in less than 30 days after a written notice of such proposed action by the insurer is given to the Owner. The cancellation clause on the Certificate(s) of Insurance shall read as specified in the Supplementary Conditions and failure to submit an insurance certificate and/or policy endorsement verifying same shall be reason for the Owner to consider the Contractor non-responsive in complying with the requirements for contract execution and may be cause for forfeiture of the Bid Security to Owner.
- 10.3 The Insurer's affording coverage shall be authorized to transact business in the State of Ohio and be listed on the most current Ohio Department of Insurance list of Ohio Licensed Companies.
- 10.4 The Contractor's Liability Insurance policy(s) shall be endorsed such that limits are on a Per Project basis.
- 10.5 The Contractor shall also provide an Owner's and Contractor's Protective Policy.

PART 11 NON-COLLUSION AFFIDAVIT

- 11.1 Collusion between bidders will be cause for rejection of affected bids and may be cause for rejection of all bids. Multiple bids submitted by one bidder under the same name or different names, whether as an individual, firm, partnership, corporation, profit or non-profit, affiliate, or association will be cause for rejection of bids. A subcontractor is not a bidder, and may submit prices to multiple bidders.
- 11.2 All bidders shall submit an affidavit that their bid is genuine and not collusive or sham; that such bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to put in a sham bid, or that such other bidder or person shall refrain from bidding; that such bidder has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the bid price of affiant or any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against the Owner or any person or persons interested in the proposed contract; that such bidder is the only party (or parties) who has an interest with the bidder in the profits of any contract which may result from the herein contained proposal; that no individual affiliated with the Owner, including but not limited to the head of any department, any employee, or any other official or officer of the Owner, is or will be directly or indirectly interested in this bid, and/or the profits from this bid if successful; that no individual affiliated with the Owner, including but not limited to the head of any department, any employee, or any other official or officer of the Owner, has or will receive anything of value as a result of the submission of this bid or its award; that no individual affiliated with the Owner, including but not limited to the head of any department, any employee, or any other official or officer of the Owner, has been solicited to provide assistance and/or provided assistance to the bidder which might give the bidder a competitive advantage or circumvent the competitive bidding process; and that all statements contained in said proposal are true; and further, that such bidder has not, directly or indirectly submitted this bid, or the contents thereof, or divulged information or data relative thereto to any association or to any member or

agent thereof.

- 11.3 Each bid must be accompanied by a completed Noncollusion Affidavit provided within the contract documents.
- 11.4 Where there is reason to believe collusion or combination among bidders exists, the Owner reserves the right to reject the bid of those concerned.

PART 12 DELINQUENT PERSONAL PROPERTY STATEMENT

- 12.1 Included with the contract documents is a Delinquent Personal Property Statement to be filled out by the successful Bidder.
- 12.2 The statement shall be sent to both the County Auditor and the County Treasurer. A signed copy shall remain in the contract documents as well.

PART 13 ORIGINAL DOCUMENTS

- 13.1 All bid forms, contract forms, bonds and any other bid documents or contract documents requiring signatures shall be submitted with original signatures. No photo copies or faxed copies of signed documents shall be accepted.

PART 14 ADDENDA

- 14.1 The bidder shall be responsible to obtain Addenda from the web at <https://bids.verdantas.com>.

END OF SECTION 10/31/23

PRICES TO INCLUDE

PART 1 - GENERAL

Any work shown on the plans or required in the specification but not paid for separately as a bid item shall be included in the cost of other bid items. The amount bid shall include the following:

- 1.1 All labor, materials, tools, equipment and transportation necessary for the proper execution of the work in accordance with Contract Documents.
- 1.2 All assistance required by the Engineer to verify compliance with the Contract Documents, including measuring for final pay quantities.
- 1.3 Completion and execution of all work shown, specified, or implied regardless of specific mention of such work in this section herein. Costs for all work items not specifically mentioned herein shall be included in the related items bid.
- 1.4 Project coordination and scheduling.
- 1.5 Detailed breakdown of lump sum bid items as requested by the Engineer.
- 1.6 All provisions necessary to protect workmen, the general public and property along the work in accordance with the Contract Documents and OSHA requirements.
- 1.7 Protection and/or replacement of existing property corner monuments.
- 1.8 Record drawings of all installed items detailed in the plans or that are performed over the during the course of the contract.
- 1.9 Reimbursement to Owner for costs for re-inspection or re-testing of any work not installed in compliance with the Contract Documents.
- 1.10 Material testing.
- 1.11 Clearing and grubbing
- 1.12 Lawn and landscaping restoration.
- 1.13 Removal and replacement of any mailboxes, street signs, above ground structures, or landscaping elements that are affected, damaged, or require temporary relocation due to the proposed improvements.
- 1.14 Mobilization of all equipment, work persons, tools, materials, and any items necessary to complete all work.
- 1.15 Bonds and insurances and/or endorsements required to fully comply with and adhere to the Contract specifications. See Instructions to Bidders Part 7 – Bid Security & Part 8 – Contract Bond as well as Specific Project Requirements Item 4 – Insurance.
- 1.16 Preconstruction televising of entire project area prior to commencement of any work or mobilizing of equipment.
- 1.17 All erosion control measures needed commensurate with the contractor's means and methods.
- 1.18 Construction staking of all improvements.

- 1.19 The unit price shall include saw cutting, removal and disposal if the proposal item includes removal.
- 1.20 The unit price for surface courses shall include the cost to seal any cracks which may develop in the asphalt pavement during the Correction Period. The sealing shall be done just prior to the end of the Correction Period unless, due to the season and inclement weather, a time extension is granted and the Correction Period is extended.
- 1.21 All concrete utilized on this project: 1) All aggregate shall meet the requirements of ODOT 703.02, Loss, sodium sulfate soundness test, 12% maximum; 2) If #57 or #67 size coarse aggregate is used, it shall be tested in accordance with ASTM C 666, Procedure B, and meet the requirements of ODOT 703.13. Copies of actual test reports and manufacturers certifications are required and shall be representative of the aggregate source proposed for use and shall be no more than 6 months old to time of submittal; 3) Class C concrete - Options 1, 2, and 3 will not be allowed.; 4) All surfaces shall be sealed with an approved cure and seal, not standard ODOT curing compound.
- 1.22 Reference to ODOT 401.20 "Asphalt Binder Price Adjustment" is to be deleted and will not apply.

PART 2 - ITEMS

All work proposed by this contract shall be quantified and paid for in accordance with the pertinent O.D.O.T specification except as specifically altered by other provisions of this contract.

2.1 (254) PAVEMENT PLANING, ASPHALT CONCRETE, AS PER PLAN

The work method of construction and materials for bituminous pavement planing shall conform to ODOT Item 254 with the following modification.

1. Bituminous pavement planing shall include planing of any existing concrete patches and/or trench caps whether exposed or covered by an asphalt layer to the depth to match existing concrete base elevation.
2. Pavement planing shall include cleaning and removal of debris and loose pieces of asphalt to the satisfaction of the Owner prior to the installation of the leveling course.
3. Unit price shall include the installation, maintenance, and removal of temporary apron wedges (ramps) as directed out of asphalt of asphalt millings for any apron lip greater than 3" after planing (as directed).
4. Unit price shall include the removal of all inlet grates, wrapping these grates with filter fabric and replacing the grates in place prior to the start of any planing. The Contractor shall maintain this filtering system throughout the project and remove the filtering system within 72 hours of the surface course placement.

All grindings shall be disposed of by the contractor except for up to 5 truckloads to be delivered to one location within the Owner's municipal limits.

Method of Measurement

The number of square yards of bituminous pavement planing shall be the actual square yards of pavement planed to the depth specified and disposed of as measured in the field.

Basis of Payment

The unit price stipulated per square yard for pavement planing of the thickness specified shall be full compensation for furnishing and placing all materials, disposal of removed material at a Owner site if specified and/or removal offsite, and furnishing of all labor, tools and equipment necessary to complete the work as specified or as shown on the contract drawings.

2.2 (301) ASPHALT CONCRETE BASE, PG64-22, AS PER PLAN

Method of Measurement

Measurement shall be in accordance with ODOT Item 301 with the exception to include removal of existing pavement and subgrade compaction.

Basis of Payment

Payment shall be made in accordance with ODOT Item 301 as applicable with the following additions:

The unit price shall also include furnishing, installation, maintenance, removal, and disposal of temporary road materials or temporary pavement courses; subgrade compaction and preparation for permanent pavement courses; traffic paint for the stop bars and crosswalks; and any additional expenses for cold weather protection. Any pavement damaged outside the contract pay limits shall be replaced at the contractor's expense.

2.3 (304) AGGREGATE BASE, AS PER PLAN

Method of Measurement

Measurement will be made on a volumetric basis for the actual number of cubic yards of aggregate base installed as measured in the field.

Basis of Payment

The unit price bid shall include labor, material and equipment necessary to install the aggregate base per ODOT Item 304 in place, including compaction and subbase preparation, completed and accepted in accordance with the plans and specification or as directed by the Engineer.

2.4 (407) TACK COAT, TRACKLESS TACK

The work, method of construction and materials for tack coat shall conform to ODOT Item 407 with the following modifications:

1. Tack coat shall be applied at a minimum rate as specified in ODOT Table 407.06-1.

2. Tack coat shall be non-tracking emulsified asphalt meeting the requirements of ODOT 702.12.

Method of Measurement

Bituminous material will be measured by the gallons furnished and placed. No measurement will be made for sand cover aggregate (if required).

Basis of Payment

The unit price stipulated per gallon of tack coat as directed for accepted quantities complete in place with no additional payment for sand cover aggregate and shall include the furnishing and placing of all materials; and furnishing of all labor, materials, tools and appliances necessary to complete the work as specified or as shown on the contract drawings.

2.5 (441) ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, (449), AS PER PLAN

The work, method of construction and materials for asphalt concrete surface course shall be in accordance with ODOT Item 448 with the following modifications:

- A. Compacted thickness shall be as detailed on the plans.
- B. Reclaimed or recycled material shall only be used per limits detailed in specifications and shall be approved by the Engineer before use.

Method of Measurement

The measurement of asphalt concrete intermediate course of the thickness specified shall be the number of cubic yards of asphalt concrete intermediate course completed and accepted in place. The area for measurements will be as shown on the plans, or as otherwise directed in writing by the Engineer. The plan quantities as adjusted for changes, errors and deviation in excess of allowable tolerances will be the method of measurement.

Basis of Payment

The accepted quantities of asphalt concrete intermediate course of the thickness specified shall be full compensation for furnishing and placing all materials, including furnishing all labor, tools, appliances, equipment and all other appurtenances necessary to complete the work as specified or as shown; including any necessary pavement saw cuts and pavement planing.

2.6 (441) ASPHALT CONCRETE SURFACE COURSE, TYPE 1, (449), PG64-22, AS PER PLAN

The work, method of construction and materials for asphalt concrete surface course shall be in accordance with ODOT Item 448 with the following modifications:

- A. Compacted thickness shall be as detailed on the plans.

- B. All gutters, street castings and joints shall be sealed with an approved liquid bituminous material 4 inches in width and the cost is to be included with the bid item.
- C. Necessary butt or tapered edge joints and pavement saw cuts shall be considered incidental costs to be included in this bid item.
- D. Where VRAM is not installed, hot applied asphalt joint adhesive is to be applied to cold longitudinal construction joints and shall conform to ODOT supplemental Specification 875. This item shall be included in the cost of Asphalt Concrete Surface Course.
- E. Reclaimed or recycled material shall only be used per limits detailed in specifications and shall be approved by the Engineer before use.
- F. Replacement of all pavement striping removed or marred on improvement and adjacent streets shall be considered incidental costs to be incurred in the Bid Item.

Method of Measurement

The measurement of asphalt concrete surface course of the thickness specified shall be the number of cubic yards of asphalt concrete surface course completed and accepted in place. The area for measurements will be as shown on the plans, or as otherwise directed in writing by the Engineer. The plan quantities as adjusted for changes, errors and deviation in excess of allowable tolerances will be the method of measurement.

Basis of Payment

The accepted quantities of asphalt concrete surface course of the thickness specified shall be full compensation for furnishing and placing all materials, including sealing materials, pavement striping, and furnishing all labor, tools, appliances, equipment and all other appurtenances necessary to complete the work as specified or as shown; including feathering at drives as necessary and butt or taped edge joints and necessary pavement saw cuts

2.7 (501) GENERAL CONSTRUCTION

The lump sum price bid shall include all work not specifically included under other bid items and alternate items. This includes, but it is not limited to, all work on the EQ basin site which is to be completed by October 1, 2026. Notably, the lump sum shall also include the cost of dewatering operations and all associated landscaping and site improvements required for project completion. Payment will be made in accordance with an approved schedule of values and agreed percent of completion of the scheduled work.

- 2.8 (452) 6-INCH NON-REINFORCED CONCRETE DRIVES AND APRONS, CLASS QC MS, INCL. FIBER REINFORCING, INCLUDING REMOVAL, AS PER PLAN
- 2.9 (608) 4 INCH CONCRETE WALK, INCLUDING REMOVAL, AS PER PLAN

The work, method of construction and materials for concrete walk, concrete curb ramps and concrete pavement for drives shall conform to ODOT Items 608, 452, 304, 203 and 202, except as modified herein or as shown on the contract drawings.

- A. There will be no separate measurement or payment for removal and disposal of existing walk or concrete drives or subbase, crushed limestone base, and subgrade compaction. These items of work shall be included in the furnishing and installation of new walks or curb ramps or concrete pavement for drives.
- B. Wire mesh reinforcing shall be furnished and installed if included in an existing apron. The cost of furnishing and installing the wire mesh reinforcing shall be included in the cost of this item of work.
- C. The unit price shall include Fiber Reinforcement as indicated.
- D. There will be no additional compensation for providing a thickened edge and/or integral curb, as detailed.
- E. ODOT Item 499 Concrete, Class QCMS mix shall be used in drives and drive aprons.
- F. ODOT Item 499 Concrete, Class QC1 shall be used for walks and curb ramps.
- G. Each and every sidewalk, drive slab and joint shall be edge tooled after texturing surface to match existing.
- H. ODOT 304 Aggregate Base, utilizing crushed limestone, shall be provided with these items.
- I. The unit price for curb ramps shall include all labor and materials necessary to construct ramps compliant with the Americans with Disabilities Act (ADA) regulations.

Method of Measurement

The quantity to be paid of concrete walk, concrete curb ramps, and concrete for drives to the thickness and class of concrete specified shall be the actual square dimension, square feet or square yards as indicated in the Proposal of finished surface complete in place.

Basis of Payment

The unit price stipulated per square foot or square yards (as indicated in the Proposal) for concrete walk, concrete curb ramp and concrete pavement for drives or aprons of the thickness and class of concrete specified shall be full compensation for furnishing all materials, grading, forming, finishing of the walk, curb ramp and pavement including removal and disposal of existing grass, sod, topsoil, bushes, trees, walk or pavement and curbs, necessary pavement saw cutting, clearing and grubbing, excavation and/or backfill to required line and grade, subgrade compaction as required, furnishing and installing subbase or base material, integral curbing, adjustment of water/gas service valves, concrete, curing compound, and expansion joint material; wire and/or mesh reinforcing as required; furnishing of all labor, tools, materials and equipment necessary to complete the work as specified or as shown.

- 2.10 (611) 16 INCH FORCE MAIN, AS PER PLAN
- 2.11 (611) 24 INCH SANITARY SEWER, AS PER PLAN

The work, method of construction and materials for sewer construction shall be in accordance with ODOT Item 611 with the modifications shown on the plans and detailed in the specifications.

Method of Measurement

The quantity of sewer to be paid for shall be determined for force main by the liner feet difference in horizontal stationing from center of the diversion structure connection to the center of the equalization basin connection, the tie in to the existing sewer main, or the end of pipe for stub connections.

Basis of Payment

The unit price stipulated per lineal foot for sewer pipe of the various sizes and types specified shall be irrespective of class of pipe and depth and if not called out as a separate pay item, shall be full compensation for maintenance of traffic for the duration of the project; earth and/or rock excavation for the pipe and foundation for same, including clearing and grubbing; removal of all materials necessary for placing the pipe, the complete removal of the existing sanitary and storm sewers, manholes and catch basins except materials listed separately; furnishing and placing granular or concrete bedding and special backfill as required, testing of compaction, constructing and subsequently removing all necessary boring and receiving pits, cofferdams, cribs, sheeting and shoring; furnishing, installing and operating necessary pumps, pipes and appurtenances necessary for flow bypassing and/or trench dewatering; sealing or banding all pipe joints where required; furnishing and installing of the pipe jointing materials and all necessary plugs, bulkheads, bends, fittings, specials and branches of a type at least equal to the conduit of which it becomes part; furnishing and installing concrete encasements, boring and steel casing pipe where required; protection, verification and/or replacement of all existing utilities, i.e., gas mains, gas connections water mains (including hydrants and their connections to the main), water connections, water wells, septic tanks, sanitary sewers, sanitary connections, storm sewers, storm connections, curb drains, catch basins, culverts, electric or telephone underground cables and/or underground connections if damaged by the Contractor; protection of existing trees or vegetation; joining of the pipe to existing and proposed manholes, catch basins, structures, and other appurtenances as required whether temporary or permanent; leakage testing or internal videotaping; disposal of all surplus and unsuitable materials; furnishing and installing temporary stone trench topping of pavement and driveways; removal and replacement of poles, posts, signs, mailboxes, paper boxes, fences, landscape timbers, guardrails, sign wiring, fixtures and other appurtenances; removal and replacement of any damaged curbing, sidewalk, driveways, parking lots and roadways as directed by the Engineer; and the furnishing of all labor, tools, materials and equipment necessary to complete the work as specified or as shown.

- 2.12 (611) CATCH BASIN, ADJUSTED TO GRADE, METHOD D.1, (BRICK), AS PER PLAN
- 2.13 (611) MANHOLE, ADJUSTED TO GRADE, METHOD D.1, (BRICK), AS PER PLAN

The work, method of construction and materials for various street castings adjusted to grade shall be in accordance with ODOT Item 611 with the following modifications:

- A. Metal adjusting rings or castings shall not be used. Existing risers shall be removed during the casting adjustment.
- B. Brick used shall be clay or shale brick meeting the requirements of ASTM C32 sewer brick, Grade SM.
- C. Concrete brick or masonry block shall not be used.
- D. The height limitation for additional compensation shall be revised from one (1) foot to two (2) feet.
- E. Type QC MS concrete shall be used for fill around all castings.
- F. All costs for work and material associated with incorporating a new style casting designated by the Owner which may include steel plates, corbelling, and/or shifting the casting to its proper location shall be included in this Item.

Method of Measurement

The quantity to be paid for of each, manholes, catch basins, water meter castings, monument boxes, gas valve boxes, water valve boxes, or service line valve boxes, adjusted to grade to be paid for shall be the actual number adjusted to grade in accordance with the contract, contract drawings and these specifications. Adjusting to grade of items proposed for new or replaced construction as part of the project will not be measured and shall be paid for in the cost of installation of that item.

Basis of Payment

The unit price stipulated, each, for manholes, catch basins, water meter castings, monument boxes, gas valve boxes, water valve boxes or service line valve boxes, adjusted to grade to be paid for under this Item shall be full compensation for furnishing and placing all material including removal, cleaning, storage and resetting of salvaged casting or new casting; pavement saw cutting, resetting of loose brick work if needed, 3/4-inch steel plates, and furnishing of all labor, tools, and necessary appurtenances to complete the work as specified or as shown on the contract drawings.

2.14 UTILITY COMPANY CHARGES ALLOWANCE

Basis of Payment

An allowance has been included in the bid proposal to be utilized as directed by the Engineer for direct costs charged by utility company(s) associated with the providing new service or other work which can be performed only/exclusively by the utility company. Payment shall be made for only work which has the prior approval of the engineer.

The contractor shall be allowed a 5% mark-up on the invoice amount for overhead and profit.

Invoices for all work completed by the utility company(s) or others shall be submitted as evidence of the work completed on the project.

No payment for this item will be made to the Contractor for utility work required when resulting from the Contractor's construction methods or rework due to his negligence or construction methods.

Any portion of the allowance not utilized shall be credited to the Owner.

TITLE 18, U.S.C. , SECTION 874

KICKBACKS FROM PUBLIC WORKS EMPLOYEES

Whoever, by force, intimidation, or threat of procuring dismissal from employment, or by any other manner whatsoever induces any person employed in the construction, prosecution, completion or repair of any public building, public work, or building or work financed in whole or in part by loans or grants from the United States, to give up any part of the compensation to which he is entitled under his contract of employment, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

April 18, 2022

M-22-11

MEMORANDUM FOR HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shalanda D. Young
Director

SUBJECT: Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure

On November 15, 2021, President Biden signed into law the Infrastructure Investment and Jobs Act (“IIJA”), Pub. L. No. 117-58, which includes the Build America, Buy America Act (“the Act”). Pub. L. No. 117-58, §§ 70901-52. The Act strengthens Made in America Laws¹ and will bolster America’s industrial base, protect national security, and support high-paying jobs. The Act requires that no later than May 14, 2022—180 days after the enactment of the IIJA—the head of each covered Federal agency² shall ensure that “none of the funds made available for a Federal financial assistance program for infrastructure, including each deficient program, may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States.”³

The Act affirms, consistent with Executive Order 14005, *Ensuring the Future Is Made in All of America by All of America’s Workers* (“the Executive Order”), this Administration’s priority to “use terms and conditions of Federal financial assistance awards to maximize the use of goods, products, and materials produced in, and services offered in, the United States.”⁴

The Act provides statutory authorities for the Made in America Office (“MIAO”) in the Office of Management and Budget (“OMB”) to maximize and enforce compliance with Made in

¹ “Made in America Laws” means all statutes, regulations, rules, and Executive Orders relating to Federal financial assistance awards or Federal procurement, including those that refer to “Buy America” or “Buy American,” that require, or provide a preference for, the purchase or acquisition of goods, products, or materials produced in the United States, including iron, steel, and manufactured products offered in the United States. Made in America Laws include laws requiring domestic preference for maritime transport, including the Merchant Marine Act of 1920 (Pub. L. No. 66-261), also known as the Jones Act. Exec. Order No. 14,005, 86 Fed. Reg. 7475, § 2(b) (Jan. 28, 2021), available at <https://www.federalregister.gov/documents/2021/01/28/2021-02038/ensuring-the-future-is-made-in-all-of-america-by-all-of-americas-workers>. Made in America Laws also include laws that give preference to Indian-owned and -controlled businesses, such as the Buy Indian Act (25 U.S.C. 47), that produce items in the United States.

² For the purposes of this guidance, the terms “Federal agency” and “agency” mean any authority of the United States that is an “agency” (as defined in section 3502 of title 44, United States Code), other than an independent regulatory agency (as defined in that section). IIJA, § 70912(3).

³ IIJA, § 70914(a).

⁴ Exec. Order No. 14,005 (see footnote 1).

America Laws.⁵ MIAO aims to increase reliance on domestic supply chains and reduce the need for waivers through a strategic process aimed at: achieving consistency across agencies; gathering data to support decision-making to make U.S. supply chains more resilient; bringing increased transparency to waivers in order to send clear demand signals to domestic producers; and concentrating efforts on changes that will have the greatest impact.⁶

This memorandum provides implementation guidance to Federal agencies on the application of: (1) a “Buy America” preference⁷ to Federal financial assistance programs for infrastructure; and (2) a transparent process to waive such a preference, when necessary. A Federal financial assistance program for infrastructure is any program under which an award may be issued for an infrastructure project, regardless of whether infrastructure is the primary purpose of the award. The term “project” means any activity related to the construction, alteration, maintenance, or repair of infrastructure in the United States.⁸

Agencies should determine how this guidance is best applied to their infrastructure programs and processes, and consult with OMB, as needed, on establishing criteria, processes, and procedures for applying a Buy America preference and issuing waivers. OMB may update or provide additional guidance, as appropriate, to further assist agencies in the implementation of a Buy America preference.

I. Application of a Buy America Preference

By May 14, 2022, agencies must ensure that all applicable programs comply with section 70914 of the Act, including by the incorporation of a Buy America preference in the terms and conditions of each award with an infrastructure project.⁹ The Act requires the following Buy America preference:

- (1) All iron and steel used in the project are produced in the United States. This means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
- (2) All manufactured products used in the project are produced in the United States. This means the manufactured product was manufactured in the United States, and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation.

⁵ IJA, § 70923(a) & (b)(1).

⁶ OMB Memorandum M-21-26, Increasing Opportunities for Domestic Sourcing and Reducing the Need for Waivers from Made in America Laws available at: <https://www.whitehouse.gov/wp-content/uploads/2020/11/M-21-06.pdf>

⁷ For the purposes of this guidance, a “Buy America” preference is a domestic content procurement preference as defined in IJA, § 70912(2).

⁸ IJA, § 70912 (5) & (7).

⁹ See Appendix I: Example of Award Term - Required Use of American Iron, Steel, Manufactured Products, and Construction Materials.

- (3) All construction materials are manufactured in the United States. This means that all manufacturing processes for the construction material occurred in the United States.^{10, 11}

II. Applicability to Federal Financial Assistance Programs

This guidance applies to all Federal financial assistance as defined in section 200.1 of title 2, Code of Federal Regulations¹²—whether or not funded through IIJA—where funds are appropriated or otherwise made available and used for a project for infrastructure. Federal financial assistance means assistance that non-Federal entities receive or administer in the form of grants, cooperative agreements, non-cash contributions or donations of property, direct assistance, loans, loan guarantees, and other types of financial assistance. The term “non-Federal entity” includes States, local governments, territories, Indian tribes, Institutions of Higher Education (IHE), and nonprofit organizations.¹³

For purposes of this guidance, for-profit organizations are not considered non-Federal entities. However, this guidance does not alter independent statutory authorities that agencies may have to include domestic content requirements in awards of Federal financial assistance issued to for-profit organizations.

Federal agencies are encouraged to consult with OMB if they are uncertain about the applicability of this guidance to any particular infrastructure program.

Before applying a Buy America preference to a covered program that will affect Tribal communities, Federal agencies should follow the consultation policies established through Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*, and consistent with policies set forth in the Presidential Memorandum of January 26, 2021, on Tribal Consultation and Strengthening Nation-Nation Relationships. Federal agencies should commence consultation promptly.

This guidance does not apply to “expenditures for assistance authorized under section 402, 403, 404, 406, 408, or 502 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. 5170a, 5170b, 5170c, 5172, 5174, or 5192) relating to a major disaster or emergency declared by the President under section 401 or 501, respectively, of such Act (42 U.S.C. 5170, 5191) or pre and post disaster or emergency response expenditures.”¹⁴ “[P]re and post disaster or emergency response expenditures” consist of expenditures for financial assistance that are (1) authorized by statutes other than the Stafford Act, 42 U.S.C. §§ 5121 et seq., and (2) made in anticipation of or response to an event or events that qualify as an “emergency” or “major disaster” within the meaning of the Stafford Act, *id.* § 5122(1), (2). Awards made to support the construction or improvement of infrastructure to mitigate the damage that may be caused by a non-imminent future emergency or disaster, such as awards

¹⁰ IIJA, § 70912 (2) & (6)(B)(ii).

¹¹ See Section VIII. of this guidance for more information on construction materials.

¹² IIJA § 70912(4)(A)

¹³ See 2 C.F.R. § 200.1.

¹⁴ IIJA § 70912(4)(B)

made under FEMA's Flood Mitigation Assistance program,¹⁵ do not qualify as "pre and post disaster or emergency response expenditures."

Subawards should conform to the terms and conditions of the Federal award from which they flow.¹⁶

The IIJA's definition of "infrastructure" encompasses public infrastructure projects. Thus, the term "infrastructure" includes, at a minimum, the structures, facilities, and equipment for, in the United States, roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property.¹⁷ Agencies should treat structures, facilities, and equipment that generate, transport, and distribute energy - including electric vehicle (EV) charging - as infrastructure.

When determining if a program has infrastructure expenditures, Federal agencies should interpret the term "infrastructure" broadly and consider the definition provided above as illustrative and not exhaustive. When determining if a particular construction project of a type not listed in the definition above constitutes "infrastructure," agencies should consider whether the project will serve a public function, including whether the project is publicly owned and operated, privately operated on behalf of the public, or is a place of public accommodation, as opposed to a project that is privately owned and not open to the public. Projects with the former qualities have greater indicia of infrastructure, while projects with the latter quality have fewer. Projects consisting solely of the purchase, construction, or improvement of a private home for personal use, for example, would not constitute an infrastructure project. Federal agencies are strongly encouraged to consult with OMB when making such determinations.

Agencies should consult with MIAO regarding their readiness to apply the requirements of the Act to covered programs. Agencies with questions regarding the application of a Buy America preference to agency-specific programs, including questions about the possible use of waivers during adjustment periods as agencies work to implement the Act, are advised to reach out to MIAO for technical assistance and advice.

III. Consistency with International Agreements

Pursuant to section 70914(e) of the Act, this guidance must be applied in a manner consistent with the obligations of the United States under international agreements.

IV. Avoid Unnecessary Disruption

The Act makes clear that its preferences apply to a Federal financial assistance program for infrastructure only to the extent that a domestic content procurement preference as described

¹⁵ See 42 U.S.C. § 4104c.

¹⁶ 2 CFR 200.101 (b) (2)

¹⁷ IIJA, § 70912(5).

in section 70914 of the Act does not already apply to iron, steel, manufactured products, and construction materials.¹⁸ Agencies should consider whether existing domestic content requirements meet the standards in the Act, as described in this memorandum. Agencies must make necessary changes to come into compliance with the Act's requirements, while preserving policies and provisions that already meet or exceed the standards required by the Act. For example, a program in which the standards for iron and steel already meet the standards in the Act may nevertheless be required to adopt new standards for manufactured products and construction materials. Maintaining current policies where appropriate avoids unnecessary disruption to programs, or elements of programs, that already meet or exceed Build America, Buy America requirements.

V. Effective Date for Awards

Agencies must ensure that, starting on May 14, 2022, all Federal financial assistance programs for infrastructure comply with the requirements of section 70914 of the Act. Therefore, new awards made on or after May 14, 2022, must take appropriate steps to ensure financial assistance awards comply with these requirements, which may include appropriate terms and conditions¹⁹ incorporating a Buy America preference. Renewal awards and amendments obligating additional funds to existing awards that are executed on or after May 14, 2022, must also include a Buy America preference. This means that agencies must include a Buy America preference in awards issued on or after May 14, 2022, even if Notices of Funding Opportunities for those awards did not include a Buy America preference. In these cases, agencies may consider whether public interest waivers may be needed to avoid undue increases in the time and cost of a project. Similarly, public interest waivers may be needed for awards and amendments made on or after May 14, 2022, where budgets for purchase of covered materials have already been agreed upon (including if materials have been ordered and construction has begun). Consistent with the guidance provided below, agencies should issue waivers judiciously and clearly communicate to recipients the limitations and conditions of any such waivers.

VI. Articles, Materials, and Supplies for Infrastructure

A Buy America preference, as defined in section I of this guidance, only applies to the iron and steel, manufactured products, and construction materials used for the infrastructure project under an award. If an agency has determined that no funds from a particular award under a covered program will be used for infrastructure, a Buy America preference does not apply to that award. Similarly, for a covered program, a Buy America preference does not apply to non-infrastructure spending under an award that also includes a covered project. A Buy America preference applies to *an entire infrastructure project*, even if it is funded by both Federal and non-Federal funds under one or more awards.

A Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply

¹⁸ IIJA, § 70917(a) &(b).

¹⁹ See Appendix I: Example of Award Term - Required Use of American Iron, Steel, Manufactured Products, and Construction Materials for exemplary language.

to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of or permanently affixed to the structure.

For the purposes of this guidance, an article, material, or supply should only be classified into *one* of the following categories: (1) iron or steel; (2) a manufactured product; or (3) a construction material. For ease of administration, an article, material, or supply should not be considered to fall into multiple categories. Agencies should apply the iron and steel test to items that are predominantly iron or steel, unless another standard applies under law or regulation.

Any waivers from these requirements must be in writing and meet the requirements of section 70914(b).

VII. Issuing Buy America Waivers

Pursuant to Section 70914(c) of the Act, the head of a Federal agency may waive the application of a Buy America preference under an infrastructure program in any case in which the head of the Federal agency finds that—

- (1) applying the domestic content procurement preference would be inconsistent with the public interest (a “public interest waiver”);
- (2) types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality (a “nonavailability waiver”); or
- (3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent (an “unreasonable cost waiver”).

Federal agencies are responsible for processing and approving all waivers, including waivers requested by recipients and on behalf of subrecipients. To the greatest extent practicable, waivers should be targeted to specific products and projects.²⁰

Before issuing a waiver, the head of the Federal agency must make publicly available on the agency’s website a detailed written explanation for the proposed determination to issue the waiver and provide at least 15 days for public comment on the proposed waiver.²¹ General applicability waivers are subject to a minimum 30-day public comment period.²² By April 29, 2022, agencies should provide the website address where they will be posting proposed waivers for public comment to MBX.OMB.MadeInAmerica@omb.eop.gov. Pursuant to sections 70914(c) and 70937 of the Act, the waiver must be cross-posted to a centralized waiver transparency website managed by GSA, [BuyAmerican.gov](https://www.buyamerican.gov),²³ no later than November 15, 2022.

²⁰ See Section VII of this guidance for information on waiver principles and criteria.

²¹ Executive Order, § 4(b)(i)(2); IJJA, § 70914(c); IJJA, § 70937 (note that “Buy American” as used in this section also refers to Buy America preferences, per IJJA, § 70932(1)).

²² IJJA § 70914(d)(2)(A)(ii). See Section VII of this guidance for information on general applicability waivers.

²³ [BuyAmerican.gov](https://www.buyamerican.gov) redirects to [MadeInAmerica.gov](https://www.madeinamerica.gov).

To minimize duplication and promote efficiency, MIAO and GSA will coordinate with agencies on the expansion of the existing website's functionality to display waivers for Federal financial assistance and provide further instructions to agencies as necessary.

Federal agencies are responsible for performing due diligence and approving or rejecting waivers consistent with the Act, this guidance, and any other applicable Buy America laws. Federal agencies should notify MIAO in advance of posting an award- or project-level proposed waiver for public comment. However, Federal agencies must consult with MIAO for proposed waivers with broader applicability (such as a general applicability waiver) before posting them for public comment. The purpose of the consultation is to identify any opportunities to structure the waiver in order to maximize the use of goods, products, and materials produced in the United States to the greatest extent possible consistent with law. Federal agencies should send proposed waivers for review to MBX.OMB.MIAwaivers@omb.eop.gov.

Federal agencies must submit to MIAO a proposed waiver for review after the public comment period has concluded. MIAO will review the proposed waiver to determine if it is consistent with applicable law and policy,²⁴ and will notify the Federal agency of its determination.

All waiver requests must include a detailed justification for the use of goods, products, or materials mined, produced, or manufactured outside the United States²⁵ and a certification that there was a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with potential suppliers.²⁶ In addition, at a minimum and to the greatest extent practicable, each proposed waiver submitted to MIAO should include the following information, as applicable:

- Waiver type (nonavailability, unreasonable cost, or public interest)
- Recipient name and Unique Entity Identifier (UEI)
- Federal awarding agency organizational information (e.g., Common Government-wide Accounting Classification (CGAC) Agency Code)
- Financial assistance listing name and number
- Federal financial assistance program name
- Federal Award Identification Number (FAIN) (if available)
- Federal financial assistance funding amount
- Total cost of infrastructure expenditures, including all Federal and non-Federal funds (to the extent known)
- Infrastructure project description and location (to the extent known)
- List of iron or steel item(s), manufactured products, and construction material(s) proposed to be excepted from Buy America requirements, including name, cost, country(ies) of origin (if known), and relevant PSC and NAICS code for each.
- A certification that the Federal official or assistance recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and nonproprietary communications with the prime contractor.

²⁴ Executive Order, § 4(c).

²⁵ IIJA, § 70937(c)(2)(A).

²⁶ IIJA, § 70937(c)(2)(D).

- A statement of waiver justification, including a description of efforts made (e.g., market research, industry outreach), by the Federal awarding agency and, in the case of a project or award specific waiver, by the recipient, in an attempt to avoid the need for a waiver. Such a justification may cite, if applicable, the absence of any Buy America-compliant bids received in response to a solicitation.
- Anticipated impact if no waiver is issued.
- Any relevant comments received through the public comment period.

The purpose of the information is to ensure that the agency has adequate information to perform due diligence, that MIAO has sufficient information to determine whether the proposed waiver is consistent with law and policy, and that sufficient information is available for public review. Information provided for public review should help interested manufacturers gauge the demand for products for which agencies are considering waiving a Buy America preference.

To avoid a need for duplicative waiver requests from entities that receive funding for one infrastructure project through multiple Federal agencies, the Federal agency contributing the greatest amount of Federal funds for the project should be considered the “Cognizant Agency for Made in America” and should take responsibility for coordinating with the other Federal awarding agencies. Such coordination will provide uniform waiver criteria and adjudication processes, minimize duplicative efforts among Federal agencies, and reduce burdens on recipients. The Cognizant Agency for Made in America shall be responsible for consulting with the other Federal awarding agencies, publicizing the proposed joint waiver, and submitting the proposed joint waiver for review to MIAO.

a. Exceptions for Unforeseen and Exigent Circumstances

In limited situations where there is an urgent need in an unforeseen and exigent circumstance, agencies have the authority to waive the application of Buy America preferences without submitting the waiver for public comment and MIAO determination.²⁷ As an exception to the public transparency requirements of the Act, agencies should exercise that authority only when necessary. Further, to ensure MIAO can fulfill its role as a central and transparent source of Made in America waivers, an agency that issues a waiver without first seeking public comment and MIAO approval must, within 30 days of the waiver’s issuance, submit a report to MIAO explaining its reliance upon the “unforeseen and exigent circumstance” exception.²⁸ MIAO will provide further instructions to agencies on how to submit those reports. Although public posting and MIAO review may be waived in exigent circumstances, agencies remain responsible for performing due diligence appropriate to the circumstances, consistent with the principles and criteria in paragraphs VII(b) and (c) below.

²⁷ IIIA, § 70937(b)(2).

²⁸ This reporting process was established pursuant to Executive Order 14,005, § 4(d) and OMB Guidance on Improving the Transparency of Made in America Waivers available at: <https://www.whitehouse.gov/wp-content/uploads/2021/10/Guidance-Memo-Improving-the-Transparency-of-Made-in-America-Waivers.pdf>.

b. Waiver Principles and Criteria

To ensure they are scrupulously monitoring, enforcing, and complying with applicable Buy America Laws and minimizing the use of waivers,²⁹ agencies must apply standard criteria to determine whether to grant a waiver in a given circumstance. Agencies with existing criteria must review it for consistency with this guidance and update it as appropriate. All other agencies must establish criteria.

Agencies may reject or grant waivers in whole or in part. To the greatest extent practicable, waivers should be issued at the project level and be product-specific. Overly broad waivers undermine market signals designed to boost domestic supply chains, particularly for key articles, materials and supplies in critical supply chains (i.e., critical supply chains identified in Executive Order 14017, *America's Supply Chains*). When necessary, agencies may consider issuing a waiver that has applicability beyond a single project; however, agencies should always issue, construe, and apply waivers to ensure the maximum utilization of goods, products, and materials produced in the United States, consistent with applicable law. Federal agencies may consult with MIAO when establishing or modifying criteria for granting waivers. They may also work within the Made in America Council, a practice that will help to foster consistency across agencies to the greatest extent practical and appropriate, given agency and program missions.

Federal agencies should use the following principles before issuing a waiver of any type:

- **Time-limited:** In certain limited circumstances, a Federal agency may determine that a waiver should be constrained principally by a length of time, rather than by the specific projects to which it applies. Waivers of this type may be appropriate, for example, when an item that is “nonavailable” is widely used in projects funded by a particular program’s awards. When issuing such a waiver, the agency should identify a short, definite time frame (e.g., no more than one to two years) designed to ensure that, as domestic supply becomes available, domestic producers will have prompt access to the market created by the program.
- **Targeted:** Waivers that are not limited to particular projects should apply only to the item(s), product(s), or material(s) or category(ies) of item(s), product(s), or material(s) necessary. Waivers that are overly broad will tend to undermine domestic preference policies. Broader waivers will receive greater scrutiny from MIAO.
- **Conditional:** Federal agencies are encouraged to issue waivers with specific conditions that support the policies of the Act and the Executive Order.

These principles and criteria should be viewed as minimum requirements for the use of waivers by Federal agencies.³⁰

Nonavailability Waivers

Before granting a nonavailability waiver, agencies should consider whether the recipient has performed thorough market research, which may be accomplished with assistance from the agency, and adequately considered, where appropriate, qualifying alternate items, products, or

²⁹ IJA § 70933(2).

³⁰ See Section IV. of this guidance for agencies that have existing regulations or guidance.

materials. Waivers should describe the market research activities and methods to identify domestically manufactured items capable of satisfying the requirement, including the timing of the research and conclusions reached on the availability of sources. Agencies are encouraged to engage with the Made in America Council to develop resource lists for common items, goods, or materials.

Unreasonable Cost Waivers

An unreasonable cost waiver is available if the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent. Before granting an unreasonable-cost waiver, to the extent permitted by law, agencies should ensure the recipient has provided adequate documentation that no domestic alternatives are available within this cost parameter. Agencies may assist recipients in gathering documentation.

For requests citing unreasonable cost as the statutory basis of the waiver, the waiver justification must include, as applicable, a comparison of the cost of the domestic product to the cost of the foreign product or a comparison of the overall cost of the project with domestic products to the overall cost of the project with foreign-origin products, pursuant to the requirements of the applicable Made in America law.³¹ Publicly available cost comparison data may be provided in lieu of proprietary pricing information.³² Unreasonable-cost waivers should be no broader than necessary.

Public Interest Waivers

A waiver in the public interest may be appropriate where an agency determines that other important policy goals cannot be achieved consistent with the Buy America requirements established by the Act and the proposed waiver would not meet the requirements for a nonavailability or unreasonable cost waiver. Such waivers shall be used judiciously and construed to ensure the maximum utilization of goods, products, and materials produced in the United States.³³ To the extent permitted by law, determination of public interest waivers shall be made by the head of the agency with the authority over the Federal financial assistance award.³⁴

Public interest waivers may have a variety of bases. As with other waivers, they should be project-specific whenever possible, as what is in the public interest may vary depending upon the circumstances of the project, recipient, and specific items, products, or materials in question.

Federal agencies may wish to consider issuing a limited number of general applicability public interest waivers in the interest of efficiency and to ease burdens for recipients. The agency remains responsible for determining whether such a waiver is appropriate to apply to any

³¹ IIJA, § 70937(c)(2)(B).

³² IIJA, § 70937(c)(2)(B).

³³ IIJA, § 70935(a).

³⁴ IIJA, § 70935(b).

given project; the Made in America Office will not review each application of such a waiver. The following are examples of types of public interest waivers an agency may consider issuing.³⁵

- **De Minimis:** Ease of administration is important to reduce burden for recipients and agencies. Federal agencies may consider whether a general applicability public interest waiver should apply to infrastructure project purchases below a de minimis threshold. An agency may consider whether a public interest waiver should apply when necessary to ensure that recipients and Federal agencies make efficient use of limited resources, especially if the cost of processing the individualized waiver(s) would risk exceeding the value of the items waived. Agencies may consider adopting an agency-wide public interest waiver that sets a de minimis threshold, for example, of 5 percent of project costs up to a maximum of \$1,000,000.
- **Small Grants:** Agencies may wish to consider whether it is in the public interest to waive application of a Buy America preference to awards below the Simplified Acquisition Threshold. This type of waiver may be particularly relevant in the initial years after enactment of IIJA, and may be phased out over time as agencies develop efficient waiver review capabilities.
- **Minor Components:** Agencies may wish to consider whether it is in the public interest to allow minor deviations for miscellaneous minor components within iron and steel products. A minor components waiver in the public interest may allow non-domestically produced miscellaneous minor components comprising no more than 5 percent of the total material cost of an otherwise domestically produced iron and steel product to be used. It would not be in the public interest to use a minor components waiver to exempt a whole product from the iron and steel requirements, or to allow the primary iron or steel components of the product to be produced other than domestically.
- **Adjustment Period:** Agencies should consider whether brief, time limited waivers to allow recipients and agencies to transition to new rules and processes may be in the public interest.
- **International Trade Obligations:** If a recipient is a State that has assumed procurement obligations pursuant to the Government Procurement Agreement or any other trade agreement, a waiver of a Made in America condition to ensure compliance with such obligations may be in the public interest.
- **Other Considerations:** A waiver may be in the public interest in one circumstance, but not in another, and considerations will depend upon the nature and amount of resources available to the recipient, the value of the items, goods, or materials in question, the potential domestic job impacts, and other policy considerations, including sustainability, equity, accessibility, performance standards, and the domestic content (if any) of and conditions under which the non-qualifying good was produced.

All proposed waivers citing the public interest as the statutory basis must include a detailed written statement, which shall address all appropriate factors, such as potential

³⁵ The list is not exhaustive and no agency is required to issue the types of waivers noted as examples. As with other general applicability waivers, generally applicable public interest waivers must be reviewed at least every five years and more often as appropriate.

obligations under international agreements, justifying why the requested waiver is in the public interest.³⁶

Before granting a waiver in the public interest, to the extent permitted by law, agencies shall assess whether a significant portion of any cost advantage of a foreign-sourced product is the result of the use of dumped steel, iron, or manufactured products or the use of injuriously subsidized steel, iron, or manufactured products.³⁷ Agencies may consult with the International Trade Administration (ITA) in making this assessment if the granting agency deems such consultation to be helpful. The agency shall integrate any findings from the assessment into its waiver determination as appropriate.³⁸ MIAO will work with ITA and agencies to develop standard processes to expedite this required assessment, such as by ensuring agencies know how to easily access lists of dumped or injuriously subsidized products.

c. General Applicability Waivers

The term “general applicability waiver” refers to a waiver that applies generally across multiple awards. A general applicability waiver can be “product-specific” (e.g., applies only to a product or category of products) or “non-product specific” (e.g., applies to all “manufactured products”).

General applicability waivers should be issued only when necessary to advance an agency’s missions and goals, consistent with IIJA, the Executive Order, and this guidance. For example, an agency might issue a general waiver for a product for which there are well-established domestic sourcing challenges. General applicability waivers will require appropriate justification from the Federal agency.

Federal agencies with one or more existing general applicability waivers, including public interest waivers, must review such waivers within five years of the date on which the waiver was issued. Agencies issuing new general applicability waivers must review such waivers at least every five years from the date of issuance. Agencies are encouraged to review general applicability waivers more frequently, when appropriate. In conducting a review of any general applicability waiver, the head of a Federal agency shall—

- (A) publish in the *Federal Register* a notice that—
 - (i) describes the justification for a general applicability waiver; and
 - (ii) requests public comments for a period of not less than 30 days on the continued need for a general applicability waiver; and
- (B) publish in the *Federal Register* a determination on whether to continue or discontinue the general applicability waiver, considering the comments received in response to the notice published under paragraph (A).³⁹

³⁶ IIJA, § 70937(c)(2)(C).

³⁷ Executive Order, § 5.

³⁸ Executive Order, § 5.

³⁹ IIJA, § 70914(d)(1) & (2).

For a period of five years beginning on the date of enactment of the Act, paragraphs (A) and (B) above shall not apply to any product-specific general applicability waiver that was issued more than 180 days before November 15, 2021.⁴⁰

By no later than November 15, 2022, agencies with existing, non-product specific general applicability waivers that were issued more than five years before November 15, 2021 should promptly commence review of each such waiver by publishing a *Federal Register* notice as required in section 70914(d)(2)(A) of the IIJA. Should the review justify retaining the waiver, agencies should consider narrowing the waiver in a manner that would support supply chain resilience and boost incentives to manufacture key products domestically, as appropriate.

To ensure prompt commencement of projects funded by IIJA, MIAO plans to work with agencies to expedite consideration of general applicability waivers for products or categories of products for which domestic sourcing challenges have been well documented. Agencies should align such waivers with complementary policies, such as work to boost supply chain resiliency and domestic employment. General applicability waivers should include appropriate expiration dates designed to ensure that, once available, Buy America qualifying products receive appropriate consideration.

VIII. Preliminary Guidance for Construction Materials

For construction materials, the Act requires that, not later than 180 days after November 15, 2021, OMB must issue standards that define the term “all manufacturing processes” in the case of construction materials. These standards must require that each manufacturing process required for the manufacture of the construction material and the inputs of the construction material occurs in the United States. They must also reflect efforts to maximize the direct and indirect jobs benefited or created in the production of the construction material.⁴¹

Although the deadline to issue such guidance has not yet passed, OMB is providing preliminary and non-binding guidance to assist agencies in determining which materials are construction materials so that agencies can begin applying Buy America requirements to those materials. This preliminary guidance addresses the requirements as set forth in section 70915(b) of the IIJA while providing sufficient time for OMB to receive additional stakeholder input.

The IIJA finds that “construction materials” includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives⁴²—that is or consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);

⁴⁰ IIJA, § 70914(d)(3).

⁴¹ IIJA, § 70915(b).

⁴² IIJA, § 70917(c)(1).

- lumber; or
- drywall.⁴³

To provide clarity to item, product, and material manufacturers and processors, we note that items that consist of two or more of the listed materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material.

Pending OMB's issuance of final standards on construction materials, and absent any existing applicable standard in law or regulation that meets or exceeds these preliminary standards, agencies should consider "all manufacturing processes" for construction materials to include at least the final manufacturing process and the immediately preceding manufacturing stage for the construction material. OMB is seeking additional stakeholder input before issuing further guidance identifying initial manufacturing processes for construction materials that should be considered as part of "all manufacturing processes."

Agencies should consult with MIAO, as needed, to ensure that any waiver issued for construction materials is explicitly targeted and time-limited, in order to send a clear market signal that additional standards for "all manufacturing processes" in the case of construction materials will be forthcoming.

⁴³ See IJA, § 70911(5).

Appendix I: Example of Award Term - Required Use of American Iron, Steel, Manufactured Products, and Construction Materials

Where applicable, the Federal agency must include appropriate terms and conditions in all awards, in accordance with applicable legal requirements and its established procedures, in order to effectuate the requirements of the Act and this guidance. The following is sample language.

To achieve the greatest possible consistency across agencies and programs, agencies should send their proposed terms and conditions to MIAO for review prior to incorporating them into applicable awards. Agencies should begin including appropriate language in NOFOs published *before* May 14, 2022 to provide applicants fair notice of the Buy America conditions that will apply to funds obligated on or after that date.

** ** **

Recipients of an award of Federal financial assistance from a program for infrastructure are hereby notified that none of the funds provided under this award may be used for a project for infrastructure unless:

- (1) all iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
- (2) all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and
- (3) all construction materials⁴⁴ are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

⁴⁴ Excludes cement and cementitious materials, aggregates such as stone, sand, or gravel, or aggregate binding agents or additives.

Waivers

When necessary, recipients may apply for, and the agency may grant, a waiver from these requirements. The agency should notify the recipient for information on the process for requesting a waiver from these requirements.

- (a) When the Federal agency has made a determination that one of the following exceptions applies, the awarding official may waive the application of the domestic content procurement preference in any case in which the agency determines that:
- (1) applying the domestic content procurement preference would be inconsistent with the public interest;
 - (2) the types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
 - (3) the inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

A request to waive the application of the domestic content procurement preference must be in writing. The agency will provide instructions on the format, contents, and supporting materials required for any waiver request. Waiver requests are subject to public comment periods of no less than 15 days and must be reviewed by the Made in America Office.

There may be instances where an award qualifies, in whole or in part, for an existing waiver described at [[link to awarding agency web site with information on currently applicable general applicability waivers](#)].

*Definitions*⁴⁵

“Construction materials” includes an article, material, or supply—other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives⁴⁶—that is or consists primarily of:

- non-ferrous metals;
- plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables);
- glass (including optic glass);
- lumber; or
- drywall.

⁴⁵ Federal agencies may choose to provide definitions on a public-facing website and reference that website in the terms and conditions, rather than including all definitions in the terms and conditions itself. If an agency chooses to do provide definitions on a public-facing website, it is not considered a deviation from the terms and conditions provided and does not need to be reviewed by OMB.

⁴⁶ IIA, § 70917(c)(1).

“Domestic content procurement preference” means all iron and steel used in the project are produced in the United States; the manufactured products used in the project are produced in the United States; or the construction materials used in the project are produced in the United States.

“Infrastructure” includes, at a minimum, the structures, facilities, and equipment for, in the United States, roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property. Infrastructure includes facilities that generate, transport, and distribute energy.

“Project” means the construction, alteration, maintenance, or repair of infrastructure in the United States.

BID FORMS

The bid forms are not available online. The bid forms are available only by purchasing a set of plans and specifications at the location indicated in the Advertisement for Bids/Public Notice to Bidders.

SECTION 2
CONTRACT FORMS

NOTICE OF AWARD

TO: «ContractName»
«ContractAddr»
«ContractCity», «ContractState» «ContractZip»

PROJECT: «TitleCaps»

You are notified that your Bid which was opened on «Bidopening» has been accepted for items in the amount of «ContractDollars» at the unit bid prices as reflected in the bid tabulation contained herein for the *(fill in awarded parts, i.e. for Base Bid and Alternate C, ... or delete).*

You are required by the Instructions to Bidders to execute the Agreement and furnish the required Bonds, Certificates of Insurance, and other documents within 10 calendar days from the date of receipt of this Notice.

Failure to comply with these conditions within the time specified will entitle Owner to consider your Bid in default, to annul this Notice and to declare your Bid Security forfeited.

The Owner will return to you one (1) fully signed set of the contract documents.

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

ACKNOWLEDGMENT

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

CONTRACT

FOR «TitleCaps»

THIS CONTRACT, made and entered into at «OwnerCity», «OwnerState», this _____ day of _____, 20____, by and between the «OwnerMuni» (“OWNER”), «OwnerState» and «ContractName» (“CONTRACTOR”).

WITNESSETH: That the said CONTRACTOR has agreed and by this presents does agree with the OWNER for the consideration hereinafter mentioned and contained, and under penalty expressed in a bond given with these presents, and herein contained or hereunto annexed, to furnish at its own cost and expense, all the necessary tools, equipment, materials, labor, and tests in an expeditious, substantial and workmanlike manner, the equipment and appurtenances herein contemplated, commencing work within 20 days from the date of the Notice to Proceed and executing the work within the time and in the manner specified and in conformity with the requirements set forth in this Contract.

The following form essential parts of the Contract (may vary with project).

1. Advertisement for Bids/Public Notice to Bidders
2. Instruction to Bidders
3. Bid Forms and Proposal
4. Contract Forms and Exhibits
5. Contract Bond – ORC 153.571 or ORC 153.57
6. Contract Provisions
7. General Conditions
8. Supplementary Conditions
9. Specifications
10. Specific Project Requirements
11. Prevailing Wage Rate Schedule
12. Contract Drawings; if any.
13. Addenda; if any.

The CONTRACTOR agrees and understands that the work on this contract shall be subject to the acceptance of the OWNER based upon and in accordance with the contract specifications and contract plans and drawings on file in the office of the OWNER.

The CONTRACTOR agrees that each individual employed by the CONTRACTOR or any Subcontractor and engaged in work on the project under this contract shall be paid by prevailing wage established by the Department of Industrial Relations of the State of Ohio or the U.S. Department of Labor (Davis-Bacon Act) as detailed in the section titled "Wage Rates." This shall occur regardless of any contractual relationship which may be said to exist between the Contractor or any Subcontractor and such individual. ***(if a School District, delete this paragraph)***

The CONTRACTOR shall proceed with the said work in a prompt and diligent manner and shall do the several parts thereof. Further the CONTRACTOR shall complete the whole of said work in accordance with the specifications and contract drawings to the satisfaction of the OWNER on or before the time stated, and in default of completion within the time as fixed, the CONTRACTOR shall pay to the OWNER as liquidated damages, an amount equal to «Liquidated», for each and every day (Sundays and legal holidays excepted) the completion of the work may be delayed beyond the date fixed in the manner and as stipulated.

It is hereby mutually agreed that the OWNER is to pay and the CONTRACTOR is to receive, as full compensation for furnishing all materials and labor in building, constructing and testing and in all respect completing the herein described work and appurtenances in the manner and under the conditions herein specified, the prices stipulated in the proposal herein contained or hereto annexed and the total contract sum is «ContractDollars».

This Contract shall be in full force and effect from the date of execution by the OWNER and CONTRACTOR.

IN WITNESS WHEREOF: The OWNER and CONTRACTOR hereunto affixed their signature the day and year first mentioned above.

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

I hereby certify that funds in the amount of «ContractAmtwords» Dollars («ContractDollars») necessary for the foregoing Contract have been appropriated and are in the Treasury, or are in the process of collection, or are available through grants and/or loans from other funding sources.

«OwnerFiscalFirst» «OwnerFiscalLast», «OwnerFiscalTitle»

APPROVED AS TO FORM:

«OwnerLegalName», «OwnerLegalTitle»

**THE CONTRACTOR SHALL FURNISH THE FOLLOWING ITEMS
WITHIN 10 DAYS OF NOTIFICATION OF AWARD:**

- A) **CERTIFICATE OF INSURANCE FOR
CONTRACTOR'S PUBLIC LIABILITY INSURANCE POLICY
AND AUTOMOTIVE INSURANCE POLICY**
Owner, Verdantas, LLC & CT Consultants, Inc. Named as Additional Insured
- B) **CERTIFICATE OF INSURANCE FOR
OWNER'S AND CONTRACTOR'S PROTECTIVE POLICY**
Owner Named as Insured (No Additional Insured)
- C) **CERTIFICATE OF WORKER'S COMPENSATION**
- D) **CONTRACT BOND THAT COMPLIES WITH ORC 153.54 AND 153.57**

* D above is not required if a bond complying with ORC 153.54 and 153.571 (rollover bond) was submitted at time of bid.

DELINQUENT PERSONAL PROPERTY STATEMENT

STATE OF _____)
) SS
COUNTY OF _____)

«ContractName», having been awarded a contract by the «OwnerMuni», «OwnerState», hereby affirms under oath, pursuant to Ohio Revised Code Section 5719.042, that at the time the bid was submitted, my company **was / was not (CIRCLE ONE)** charged with delinquent personal property taxes on the General Tax List of Personal Property for «OwnerCounty» County, Ohio.

If such charge for delinquent personal property tax exists on the General Tax List of Personal Property for «OwnerCounty» County, Ohio, the amount of such due and unpaid delinquent taxes, including due and unpaid penalties and interest shall be set forth below.

A copy of this statement shall be transmitted by the Taxing District's Fiscal Officer to the County Treasurer within thirty days of the date it is submitted. A copy of this statement shall also be incorporated into the Contract made between «OwnerMuni», «OwnerState», and «ContractName», and no payment shall be made with respect to any Contract unless such statement has been so incorporated as a part thereof.

Delinquent Personal Property Tax	\$ _____
Penalties	\$ _____
Interest	\$ _____

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

Subscribed and sworn to before me this _____ day of _____, 20 _____.

Notary Public

My Commission Expires: _____

AFFIDAVIT
OF COMPLIANCE WITH OHIO REVISED CODE SECTION 3517.13

STATE OF _____)
) SS
COUNTY OF _____)

_____ being duly sworn deposes and states as follows:

1. I am duly authorized to make the statements contained herein on behalf of _____ (“the Contracting Party”).
2. The Contracting Party is a/an (select one):
 - ☐ Individual, partnership, or other unincorporated business association (including without limitation, a professional association organized under Ohio Revised Code Chapter 1787), estate, or trust
 - ☐ Corporation organized and existing under the laws of the State of _____
 - ☐ Labor organization
3. I hereby affirm that the Contracting Party and each of the individuals specified in R.C. 3517.13(I) (with respect to non-corporate entities and labor organizations) or R.C. 3517.13(J) (with respect to corporations) are in full compliance with the political contribution limitations set forth in R.C. 3517.13(I) and (J), as applicable.
4. I understand that a false representation on this certification will incur penalties pursuant to 3517.992(R).

Affiant further sayeth naught.

By: _____

Title: _____

SWORN TO BEFORE ME and subscribed in my presence this _____ day of _____, 20_____.

Notary Public

My commission expires: _____

ESCROW AGREEMENT FOR CONTRACTOR'S RETAINAGE

In accordance with a certain Contract between the «OwnerMuni», «OwnerState», (hereinafter referred to as "the Owner") and «ContractName», (hereinafter referred to as "the Contractor"), an Escrow Agent is hereby appointed to hold funds arising out of the Owner's agreement to pay retainage into an escrow fund, said Agent to be:

All retained funds will be placed with the above Escrow Agent from the date your Contract is certified as being 50% complete pursuant to Sections 153.13, and 153.14 and 153.63 Ohio Revised Code.

During the time the aforementioned retained funds are in the custody of the Escrow Agent, the Escrow Agent has authority to invest the escrow funds in the classes of securities listed below which, in the judgment of the Escrow Agent, allow for the least risk to capital preservation and provide for a reasonable income. The income from investment of the escrowed funds shall be accumulated in the escrow account.

- (a) Obligation issued or guaranteed as to interest and principal by the government of the United States, or obligations of the State of Ohio or any political subdivision thereof;
- (b) Obligations including certificates of deposit of any national bank located in this State and/or any bank as defined by Section 1101.01, O.R.C.;
- (c) Repurchase agreements fully secured by obligations of any kind specified in clauses (a) and (b) above; or
- (d) Interest in any money market fund or trust, the investments of which are generally restricted to obligations of any of the kind specified in clauses (a) through (c) above.

The Escrow Agent shall hold the escrowed principal and interest until receipt of notice from the Owner, or until receipt of an Arbitration Order or an Order of the Court of Claims, or other appropriate courts, specifying the amount of the escrowed principal to be released and the person to whom it is to be released. Upon receipt of such a request or order, the Escrow Agent shall, within 30 days, pay such amount of principal and interest earned on the retainage to the Contractor less the Escrow Agent's fee.

It is understood that the Escrow Agent shall have no duties, obligations, or liabilities hereunder other than to hold and invest said funds and to deliver them in accordance with the provisions hereof.

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

«OwnerCaps»

«OwnerFiscalFirst» «OwnerFiscalLast», «OwnerFiscalTitle»

ESCROW WAIVER

In accordance with a certain Contract between the «OwnerMuni», «OwnerState», (hereinafter referred to as "the Owner") and «ContractName», (hereinafter referred to as "the Contractor") it is mutually agreed by and between the parties hereto that because of the short-term duration of the within contract, no escrow account will be established pursuant to Sections 153.13, 153.14 and 153.63 of the Ohio Revised Code nor shall any interest be paid on any retainage.

«ContractCAPName»

«ContractFirst» «ContractLast», «ContractTitle»

«OwnerCaps»

«OwnerFiscalFirst» «OwnerFiscalLast», «OwnerFiscalTitle»

NOTICE TO PROCEED

Project: «Title»

Owner: «OwnerMuni»
«OwnerAddr»
«OwnerCity», «OwnerState» «OwnerZip»

To: «ContractName»
«ContractAddr»
«ContractCity», «ContractState» «ContractZip»

Date: _____

You are hereby notified to commence work in accordance with the Contract. All work shall be completed by «Completion_Date».

«OwnerCaps»

«OwnerCEOFirst» «OwnerCEOLast», «OwnerCEOTitle»

BYRD ANTI-LOBBYING AMENDMENT CERTIFICATION

(To be submitted with each bid or offer exceeding \$100,000)

The undersigned, _____ of _____
(the "Company") hereby certifies, to the best of his or her knowledge, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Company certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. § 3801 et seq., apply to this certification and disclosure, if any.

Signature of Company Authorized Official

Name and Title of Company Authorized Official

Date

THE OWNER OR THEIR AUTHORIZED REPRESENTATIVE SHALL INSERT THE FOLLOWING CONTRACT DOCUMENTATION IN THE EXECUTED CONTRACT:

A) FINDINGS FOR RECOVERY – ORC 9.24
(<http://ffr.ohioauditor.gov/>)

B1) CHECK FOR DEBARRED CONTRACTORS IN THE STATE OF OHIO
(<https://www.sos.state.oh.us/records/debarred-contractors/>)

B2) CHECK FEDERAL SAM (System for Award Management) for
FEDERAL FUNDING (including sub-contractors), (if applicable)
(<https://www.sam.gov/SAM/>)

C) NOTIFICATION OF SURETY AND AGENT OF CONSTRUCTION
CONTRACT AWARD – ORC 9.32 (if applicable)

~~D) NOTIFICATION TO UTILITY COMPANIES OF COMMENCEMENT
OF CONTRACT EXECUTION – ORC 153.64 (if applicable)~~

SECTION 3
GENERAL CONDITIONS

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by



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A Practice Division of the

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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1420 King Street, Alexandria, VA 22314-2794
(703) 684-2882
www.nspe.org

American Council of Engineering Companies
1015 15th Street N.W., Washington, DC 20005
(202) 347-7474
www.acec.org

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400
(800) 548-2723
www.asce.org

Associated General Contractors of America
2300 Wilson Boulevard, Suite 400, Arlington, VA 22201-3308
(703) 548-3118
www.agc.org

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Amending and Supplementing Contract Documents

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other

professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price

or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by

Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property

insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery

against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and

- 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or

other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all

court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 Use of Site and Other Areas

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor

shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop

Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 6. any inspection, test, or approval by others; or
 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor,

Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits

and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The

opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on

Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
- b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee:* The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;

- c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
- d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
- e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
- f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the

control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and

equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the

Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or

- b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

- 1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or

- d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities

pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2007 ed.) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented herein or in the Specific Project Requirements remain in full force and effect.

SC-1.01 The terms used in these Supplementary Conditions which are defined in the General Conditions have the meaning assigned to them in the General Conditions.

SC-2.02 Delete paragraph 2.02(A) in its entirety and insert the following in its place:

Owner shall furnish one (1) printed/hard copy of the drawings and Project Manual which shall be an executed contract set and one set in electronic format (.pdf), if requested.

SC-2.03 (A) In the last sentence of 2.03A, change "sixtieth day" to "one hundred fiftieth day."

SC-2.03 (B) By submission of a bid, the bidder hereby grants consent that the award and execution period shall be extended from sixty days to **one hundred twenty days** after the date on which the bids are opened.

SC-4.02(A) Change "Supplementary Conditions" to read "Specific Project Requirements."

SC-4.06(G) Delete paragraph 4.06(G) in its entirety.

SC-5.03(A)(1) The required Certificate of Insurance shall be in a form satisfactory to the Owner (most current version of ACORD 25 or approved equal). If the Contractor fails to procure and maintain any specified and/or required insurance, the Owner shall have the right to procure and maintain the said insurance for and in the name of the Contractor and the Contractor shall pay the cost thereof and shall furnish all necessary information to make effective and maintain such insurance.

SC-5.04(B)(1) Change "Supplementary Conditions" to read "Specific Project Requirements."

SC-5.04(B)(2) The limits of liability for the insurance required by paragraph 5.04(A) of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

All of the limits below may be satisfied with an Umbrella/Excess Liability as needed to increase the Primary Policy to required limits.

5.04(A)(1) and (2) Workers' Compensation, etc., under paragraphs 5.04(A)(1) and 5.04(A)(2) of the General Conditions:

(a) State	Statutory
(b) Applicable Federal (e.g., Longshoreman's):	Statutory
(c) Employer's Liability:	\$1,000,000

5.04(A)(3), (4) and (5). Contractor's Liability Insurance under paragraphs 5.04(A)(3) through 5.04(A)(5) of the General Conditions which shall also include completed operations and product liability coverage.

- (a) Bodily Injury and Property Damage, Combined Single Limit (CSL) (Except Products and Completed Operations) Property Damage liability insurance will provide Explosion, Collapse, and Underground coverage where applicable.

Each Occurrence	\$2,000,000

General Aggregate	\$4,000,000

- (b) Products and Completed Operations Aggregate \$1,000,000

Products and Completed Operations to be maintained for two (2) years after final payment and Contractor shall continue to provide evidence of such coverage to the Owner on an annual basis during the aforementioned period.

- (c) Personal and Advertising Injury (Per Person/Organization and per occurrence). \$1,000,000

- (d) Fire Damage \$100,000

- (e) If the General Liability Policy includes a General Aggregate, such policy shall be endorsed to have the General Aggregate Per Project Aggregate Limit.

5.04(A)(6) Automobile Liability - (Owned, Non-Owned, Hired)
Contractor may provide split limits or combined single limit.

- (a) Split Limits:

Bodily Injury,	Each Person:	\$2,000,000
	Each Occurrence	\$2,000,000

Property Damage,	Each Occurrence	\$1,000,000

or

- (b) Combined Single Limit

Bodily Injury and Property Damage,	
Each Occurrence	\$2,000,000

SC-5.04(B)(3) Add the following to the end of the paragraph: "to the extent available in the insurance industry with industry standard exclusions and as allowed under the laws and regulations in the State of Ohio;"

SC-5.04(B)(4) Add the following:

Written notice of cancellation for non-payment of premium shall be at least 10 days.

Add the following section:

SC-5.04(C) Unless otherwise stated in Specific Project Requirements, the Contractor shall purchase and provide an "Owner's and Contractor's Protective Policy" with an immediate Effective Date and the Owner listed as the insured (No additional insureds) for the following limits:

Each Occurrence	\$1,000,000
General Aggregate	\$2,000,000

Add the following section:

SC-5.04(D) Unless otherwise stated in Specific Project Requirements the Contractor shall purchase and maintain during the Contract Time "All Risk Builders' Risk Insurance," and/or "Installation Floater Insurance," and/or "Boiler and Machinery Insurance," and any and all insurance requirements of section GC-5.06 of the General Conditions as applicable for the type of work to be performed upon the Project to the full insurable value thereof for the benefit of the Owner, the Contractor, Subcontractors and Suppliers as their interest may appear. This insurance shall cover the work until final acceptance and final payment by the Owner. This provision shall in no way release the Contractor or Contractor's Surety from obligations under the Contract Documents to fully complete the Project. The original policy(s) shall be filed with the Owner or his designated representative.

SC-5.05 *Owner's Liability Insurance*

See SC-5.04(C) above.

SC-5.06 *Property Insurance*

Unless otherwise stated in Specific Project Requirements, the Contractor, not the Owner, shall purchase and maintain during the Contract Time all property insurance required in section GC-5.06 of the General Conditions and as outlined in SC-5.04(D) above.

Add the following section:

SC-6.02(C) The Contractor shall be responsible for the Owner and/or Engineer's additional inspection and administrative costs for work performed beyond regular working hours as defined in this Section.

SC-6.07(B) Delete paragraph 6.07(B) in its entirety.

SC-6.09 (D) Add the following:

D. The contractor agrees to the requirements of RC 153.59, RC 153.591, and RC 153.60.

Add the following section:

SC-6.10(B) Add the following:

Should the Owner be exempt from Ohio State Sales and Use Taxes on materials and equipment to be incorporated in the Project, the Contractor may obtain a waiver and said taxes shall not be included in the Contract Price.

1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the work
2. Owner's exemption to Contractor does not apply to construction tools, machinery, equipment, or other property by or leased by Contractor, or to supplies or materials not incorporated into the work.

The Contractor shall withhold and/or pay all consumer, use, property, employment, income and other taxes in accordance with the laws and regulations of the United States, State of Ohio, Owner and other applicable agencies which are applicable during the performance of the work.

SC-6.17 *Shop Drawings and Samples*

Add the following new paragraphs immediately after paragraph 6.17(E):

- F. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three (3) submittals. Engineer will record Engineer's time for reviewing subsequent materials of shop drawings, samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- G. In the event that Contractor requests a substitution for a previously approved item, Contractor shall reimburse Owner for Engineer's charges for such time unless the need for such substitution is beyond the control of the Contractor.

SC-7.02 Delete Section 7.02 of the General Conditions in its entirety and insert the following:

SC-7.02(A) The General Construction Contractor shall be referred to and defined as the Construction Coordinator.

SC-7.02(B) Duties of the Construction Coordinator include the following:

1. Scheduling and coordinating the work of the Prime Contractors including submission and periodic updating of project schedule.

2. Establishing and administrating the site safety program and procedures for the project.
3. See that permits are applied for and obtained on a timely basis. Advise the Engineer of any problems related to permit approval.
4. Monitoring compliance with Laws and Regulations.
5. Maintain project site for dust, sedimentation, debris, waste, and general site cleanliness.
6. Coordinate location and use of temporary construction facilities including but not limited to sanitary, water, power, telephone, and parking.
7. Coordinate Owner interface for utility tie-ins/shut downs.
8. Monitor shop drawing submittal and coordination of submittal information between Prime Contractors.

- SC-10.01 (A) Add the following:
The Owner may request from the Contractor and the Contractor shall provide within ten days of the request, a quote for all ordered changes in the work or work the Owner may be considering to be ordered. The quote shall be a line item, detailed, itemized breakdown of the work.
- SC-11.01(A) For purposes of "Cost of the Work" delete Section 11.01(A), (B), and (C) of the General Conditions in their entirety and insert ODOT 109.05, in its place.
- SC-13.07(A) In the First sentence of Section 13.07(A) remove "Substantial Completion" and insert "Final Acceptance of the entire project and final payment by the Owner."
- SC-13.07(C) Remove 13.07(C) and replace with the following:
- All materials and equipment shall be warranted by the respective material supplier or equipment manufacturer until the end of the Contractor's "correction period" (or longer if specified elsewhere in the contract) regardless of date of initial installation or operation of the material or equipment. The cost of such extended warranties as needed from material suppliers or equipment manufacturers to provide warranty coverage until the end of the "correction period" or other period as specified in the contract shall be the responsibility of the prime contractor and shall be assumed to have been included in his bid.

SC-14.02(A) (3) Delete Section 14.02(A) (3) of the General Conditions in its entirety and insert the following:

Until the job is 50% complete, the Contractor will be paid 92% of the estimated value of labor and material completed in acceptable form. After the work is 50% complete, no further funds shall be retained and the Contractor shall be paid 100% of the estimated value of the remaining labor and material completed in acceptable form, provided that the Contractor is making satisfactory progress and there is no specific cause for greater withholding. Upon the Owner's agreement that the project is substantially complete, the Retainage may be reduced to twice the value of the remaining punch list work subject to the recommendation of the Engineer and the approval by the Owner.

Add the following section:

SC-14.02(A) (4)

Payment for stored materials at invoice prices or at the unit price bid for materials, or the lesser value of the two, will be made for accepted nonperishable equipment and materials which are to be incorporated into the work, when accepted, delivered, properly stored, and protected upon the site and verified to the Engineer by a copy of the invoice. For materials and equipment meeting the foregoing conditions, the Owner will pay, when properly included in an approved estimate, 92% of the invoice value of the same. Subsequent to the inclusion of a payment for delivered materials in a progress payment, Contractor shall submit no later than the next payment submission, a partial waiver of lien from each and every supplier for whom delivered materials were paid. If no such waiver is submitted prior to or along with the next payment, the amount of delivered materials paid commensurate with that particular item will be deducted from future payments. No payment for delivered materials shall be made for any items that are scheduled to be incorporated in the work within 30 days of submission of the pay estimate. Delivered materials will not be paid in any given month for a total amount less than \$5,000.00. Payment for delivered materials for such items as pipe backfill and roadway subbase will not be routinely considered.

SC-16.01 Delete Article 16 in its entirety and replace with the following:

ARTICLE 16 - DISPUTE RESOLUTION AGREEMENT - JUDICIAL SYSTEM

OWNER and CONTRACTOR hereby agree that Article 16 of the General Conditions to the Agreement between OWNER and CONTRACTOR is amended to include the following agreement of the parties:

- 16.1 Litigation and Arbitration: This contract arose in the City of Willoughby, Lake County, Ohio. This agreement takes effect upon its acceptance and execution by all the parties to this Agreement; and shall be interpreted and construed under the laws of Ohio, which laws shall prevail in the event of any conflict of law. The OWNER reserves the right and in its sole discretion, to resolve all claims, disputes and other matters in question between the OWNER and CONTRACTOR arising out of or relating to the Contract Documents; through a Court of Law or Arbitration. The decision to bring any action through a Court of Law in Lake County, Ohio or via arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association rests solely with the City of Willoughby, Ohio.

END OF SECTION

01/2024

SECTION 5
SPECIFICATIONS

SECTION 011000 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Contract description.
3. Contractor's use of Site and Premises.
4. Work sequence.
5. Work restrictions.
6. Permits.
7. Specification conventions.
8. Drawing Schedule

B. Related Requirements:

1. Section 013216 - Construction Progress Schedule: Digital project management procedures and web-based project management software package.
2. Section 015000 - Temporary Facilities and Controls: Limitations and procedures governing temporary use of Owner's facilities.
3. Section 017000 - Execution and Closeout Requirements: Coordination of Owner-installed products.

1.2 PROJECT INFORMATION

A. Name: Lakeshore East Equalization Basin.

1. Project Address: Forest Dr, Eastlake, OH 44095
2. Project Location Description: Project extends generally from the intersection of Lakeshore Boulevard and Forest Drive to the property located at 35150 Lakeshore Blvd (parcel fronts on Forest Drive), in Eastlake, Ohio 44095.

B. Owner: City of Willoughby

1. Owner's Representative:
 - a. Rich Palmisano
 - b. rpalmisano@Willoughbyohio.com

C. Engineer: Verdantas Company.

1. Engineer's Representative:
 - a. Ryan Schuster, P.E.
 - b. rschuster@verdantas.com

1.3 CONTRACT DESCRIPTION

A. Improvements

1. The project will include the installation of a circular 1.35 MG concrete equalization basin, wet well, valve vault, regulator structure, and control building, all to be located on 35150 Lakeshore Blvd.
 - a. The concrete tank shall be constructed as a pre-stressed or post-tensioned concrete tank with a dome.
2. Electrical, mechanical, telemetry and SCADA integration, and associated work for initiating operations of the valve vault, wet well, Regulator Structure, and Diversion Structure. The Regulator Structure and Diversion Structure are being constructed by others in Phase 1.
3. Site work includes the installation of 16-inch force main and 24-inch gravity sewers.
4. Forest Drive shall be reconstructed at the completion of all other work associated with the completion of the equalization basin and force main diversions. This work, including the limits of replacement, are detailed in the plans and specifications.

1.4 SUBSTANTIAL CONTRACTOR'S USE OF SITE AND PREMISES

A. Limits on Use of Site: Limit use of Project Site to Work in areas indicated. Do not disturb portions of Project Site beyond areas in which the Work is indicated.

1. Limit use of Site to allow:
 - a. Construction limits are defined on the existing conditions drawing. The Contractor is limited to keep work within these limits and any disturbance outside of the limits shall be restored to their preconstruction condition or better with not additional payment.
 - b. Area outside of the property where the equalization basin shall be limited to work being kept within the public right-of-way.
2. Driveways, Walkways, and Entrances: Keep driveways, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on Site.

B. Utility Outages and Shutdown:

1. Coordinate and schedule electrical and other utility outages with Owner.
2. Outages: Allow only at previously agreed upon times.

1.5 WORK SEQUENCE

- A. Construct Work in order to accommodate Owner's occupancy requirements during construction period. Coordinate construction schedule and operations with Engineer:
- B. Sequencing of Construction Plan: The Contractor shall provide a detailed construction progress schedule in accordance with Specification 013216 – Construction Progress Schedule.

1.6 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction (AHJ).
- B. On-Site Work Hours: Limit Work to between 7 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and AHJ.
- C. On-Site Work Day Restrictions: Do not perform Work resulting in utility shutdowns on Site during Work blackout days indicated by Owner.
- D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions, and only after arranging for temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- E. Noise, Vibration, Dust, and Odors: Coordinate with Owner operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.

1.7 PERMITS

- A. Furnish necessary permits (as applicable) for construction of Work, including the following:
 - 1. Control Building permit: Industrialized Unit, and associated foundations, mechanical, plumbing, and electrical work.
 - 2. Electrical permits: Including all tanks, underground structures, valve vaults, wet wells, etc., and related aboveground and underground electrical work, where electrical work occurs.
 - 3. Stormwater permit.
 - 4. Dewatering permit.

1.8 SPECIFICATION CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
- B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on the Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.9 DRAWING SCHEDULE

- A. The work to be done under this Contract is shown within the Drawings – Sheets 1 – 45.

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance.
- B. Product options.
- C. Product substitution procedures.

1.2 QUALITY ASSURANCE

- A. Contract is based on products and standards established in Contract Documents without consideration of proposed substitutions.
- B. Products specified define standard of quality, type, function, dimension, appearance, and performance required. The Contractor shall prepare his bid on the particular materials and equipment specified.
- C. Substitution Proposals: Permitted for specified products except where specified otherwise. Do not substitute products unless substitution has been accepted and approved in writing by Owner. Following the award of the contract, should the Contractor desire to use other equipment and materials, they shall submit to the Owner a written request for such change and state the advantage to the Owner and the savings or additional cost involved by the proposed substitution. The determination as to whether or not such change will be permitted rests with the Owner and Engineer. Do not substitute products unless substitution has been accepted and approved in writing by the Owner.
- D. Each major item of equipment shall be inspected by a manufacturer's representative during installation and upon completion of work. The Contractor shall supply the Engineer with a certificate of such inspection.

1.3 PRODUCT OPTIONS

- A. See Section 016000 - Product Requirements.

1.4 PRODUCT SUBSTITUTION PROCEDURES

- A. Document each request with complete data, substantiating compliance of proposed substitution with Contract Documents, including:
 - 1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.

2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
3. Reference to Article and Paragraph numbers in Specification Section.
4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
5. Changes required in other Work.
6. Availability of maintenance service and source of replacement parts as applicable.
7. Certified test data to show compliance with performance characteristics specified.
8. Samples when applicable or requested.
9. Other information as necessary to assist Architect/Engineer's evaluation.

B. A request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
2. Will provide same warranty for substitution as for specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Will coordinate installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
6. Will reimburse Owner for review or redesign services associated with reapproval by authorities having jurisdiction.

C. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals without separate written request or when acceptance will require revision to Contract Documents.

D. Substitution Submittal Procedure:

1. Submit requests for substitutions on CSI Form 13.1A Substitution Request – After the Bidding/ Negotiating Stage.
2. Submit electronic files to Engineer of Request for Substitution for consideration. Limit each request to one proposed substitution.
3. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
4. Architect/Engineer will notify Contractor in writing of decision to accept or reject request.

END OF SECTION 012500

SECTION 013000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Coordination and Project conditions.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Preinstallation meetings.
- F. Closeout meeting.
- G. Alteration procedures.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various Sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify that utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate Work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit as closely as practical; place runs parallel with lines of building. Use spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - 1. Coordination Drawings: Prepare as required to coordinate all portions of Work. Show relationship and integration of different construction elements that require coordination during fabrication or installation to fit in space provided or to function as intended. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are important.
- D. Coordination Meetings: In addition to other meetings specified in this Section, hold coordination meetings with personnel and Subcontractors to ensure coordination of Work.
- E. In finished areas, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of Work of separate Sections in preparation for Substantial Completion.

- G. After Owner's occupancy of premises, coordinate access to Site for correction of defective Work and Work not complying with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

- A. Owner will schedule and preside over meeting after Notice of Award.
- B. Attendance Required: Architect/ Engineer, Owner, and Contractor.
- C. Minimum Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of products, schedule of values, and Progress Schedule.
 - 5. Designation of personnel representing parties in Contract and Architect/Engineer.
 - 6. Communication procedures.
 - 7. Procedures and processing of requests for interpretations, field decisions, field orders, submittals, substitutions, Applications for Payments, proposal request, Change Orders, and Contract closeout procedures.
 - 8. Scheduling.
 - 9. Erosion Control Efforts.
 - 10. Critical Work sequencing.
- D. The Contractor shall bring a construction progress schedule, erosion control plan, quality control program, concrete mix designs, asphalt mix designs, etc. that will all require Engineer approval prior to the start of work.
- E. Construction Manager: Record minutes and distribute to participants within two days after meeting, to Architect/Engineer, Owner, and those affected by decisions made.

1.4 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Contractor: Make arrangements for meetings, prepare agenda with copies for participants, and preside over meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, and Architect/Engineer, Owner, as appropriate to agenda topics for each meeting.
- D. Minimum Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.

4. Identification of problems impeding planned progress.
5. Review of submittal schedule and status of submittals.
6. Review of off-Site fabrication and delivery schedules.
7. Maintenance of Progress Schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on Progress Schedule and coordination.
13. Other business relating to Work.

- E. Contractor: Record minutes and distribute to participants within two days after meeting, to Architect/Engineer, Owner, and those affected by decisions made.

1.5 PREINSTALLATION MEETINGS

- A. When required in individual Specification Sections, convene preinstallation meetings at Project Site before starting Work of specific Section.
- B. Require attendance of parties directly affecting, or affected by, Work of specific Section.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Prepare agenda and preside over meeting:
 1. Review conditions of installation, preparation, and installation procedures.
 2. Review coordination with related Work.
- E. Record minutes and distribute to participants within two days after meeting, to Architect/Engineer, Owner, and those affected by decisions made.

1.6 CLOSEOUT MEETING

- A. Schedule Project closeout meeting with sufficient time to prepare for requesting Substantial Completion. Preside over meeting and be responsible for minutes.
- B. Attendance Required: Contractor, major Subcontractors, Architect/ Engineer, Owner and others appropriate to agenda.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Minimum Agenda:
 1. Start-up of facilities and systems.
 2. Operations and maintenance manuals.
 3. Testing, adjusting, and balancing.
 4. System demonstration and observation.
 5. Operation and maintenance instructions for Owner's personnel.
 6. Contractor's inspection of Work.
 7. Contractor's preparation of an initial "punch list."

8. Procedure to request Architect/Engineer inspection to determine date of Substantial Completion.
 9. Completion time for correcting deficiencies.
 10. Inspections by authorities having jurisdiction.
 11. Certificate of Occupancy and transfer of insurance responsibilities.
 12. Partial release of retainage.
 13. Final cleaning.
 14. Preparation for final inspection.
 15. Closeout Submittals:
 - a. Project record documents.
 - b. Operating and maintenance documents.
 - c. Operating and maintenance materials.
 - d. Affidavits.
 16. Final Application for Payment.
 17. Contractor's demobilization of Site.
 18. Maintenance.
- E. Record minutes and distribute to participants within two days after meeting, to Architect/Engineer, Owner, and those affected by decisions made.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION

3.1 ALTERATION PROCEDURES

- A. Entire facility will be occupied for normal operations during progress of construction. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage.
 1. Perform Work not to interfere with operations of occupied areas.
 2. Keep utility and service outages to a minimum and perform only after written approval of Owner.
 3. Clean Owner-occupied areas daily. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.
- B. Materials: As specified in product Sections; match existing products with new products for patching and extending Work.
- C. Employ skilled and experienced installer to perform alteration and renovation Work.
- D. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion. Comply with Section 017000 - Execution and Closeout Requirements
- E. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.

- F. Remove debris and abandoned items from area and from concealed spaces.
- G. Prepare surface and remove surface finishes to permit installation of new Work and finishes.
- H. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity.
- I. Remove, cut, and patch Work to minimize damage and to permit restoring products and finishes to original condition.
- J. Where new Work abuts or aligns with existing Work, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.
- L. Patch or replace portions of existing surfaces that are damaged, lifted, discolored, or showing other imperfections.
- M. Finish surfaces as specified in individual product Sections.

END OF SECTION 013000

SECTION 013216 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. Bar chart schedules.
- D. Review and evaluation.
- E. Updating schedules.
- F. Distribution.

1.2 DIGITAL PROJECT DATA LICENSING

- A. Architect's/Engineer's Data Files Not Available: Architect/Engineer will not provide Architect's/Engineer's CAD drawing digital data files for Contractor's use during construction.

1.3 SUBMITTALS

- A. Immediately after signing the Contract, the Contractor shall prepare a graphic progress schedule, indicating the work to be executed during each month and the rate of expected progress to secure completion on the agreed upon completion date. The progress schedule shall be approved by the Engineer and Owner prior to starting work on the site. Schedule updates and narrative progress reports shall be furnished to the Engineer with each requisition for payment.
- B. Schedule Updates:
 - 1. Overall percent complete, projected and actual.
 - 2. Completion progress by listed activity and sub-activity, to within five days prior to submittal.
 - 3. Changes in Work scope and activities modified since submittal.
 - 4. Delays in submittals or resubmittals, deliveries, or Work.
 - 5. Adjusted or modified sequences of Work.
 - 6. Other identifiable changes.
 - 7. Revised projections of progress and completion.
- C. Narrative Progress Report:
 - 1. Submit with each submission of Progress Schedule.
 - 2. Summary of Work completed during the past period between reports.
 - 3. Work planned during the next period.

4. Explanation of differences between summary of Work completed and Work planned in previously submitted report.
5. Current and anticipated delaying factors and estimated impact on other activities and completion milestones.
6. Corrective action taken or proposed.

1.4 QUALITY ASSURANCE

- A. Scheduler: Contractor's personnel specializing in CPM scheduling with experience in scheduling construction work of complexity comparable to the Project.
- B. Contractor's Administrative Personnel: Experience in using and monitoring CPM schedules on comparable Projects.

1.5 BAR CHART SCHEDULES

- A. Format: Bar Chart Schedule, to include at least:
 1. Identification and listing in chronological order of those activities reasonable required to complete the Work, including:
 - a. Subcontract Work.
 - b. Major equipment design, fabrication, factory testing, and delivery dates including required lead times.
 - c. Move-in and other preliminary activities.
 - d. Equipment and equipment system test and startup activities.
 - e. Project closeout and cleanup.
 - f. Work sequences, constraints, and milestones.
 2. Listing identified by Specification Section number.
 3. Identification of the following:
 - a. Horizontal time frame by year, month, and week.
 - b. Duration, early start, and completion for each activity and subactivity.
 - c. Critical activities and Project float.
 - d. Subschedules to further define critical portions of Work.

1.6 REVIEW AND EVALUATION

- A. Participate in joint review and evaluation of schedules with Architect/Engineer at each submittal.
- B. Evaluate Project status to determine Work behind schedule and Work ahead of schedule.
- C. After review, revise schedules incorporating results of review, and resubmit within 10 days.

1.7 UPDATING SCHEDULES

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity. Update schedules to depict current status of Work.

- C. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- D. Upon approval of a Change Order, include the change in the next schedule submittal.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit sorts as required to support recommended changes.
- G. Prepare narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken or proposed and its effect.

1.8 DISTRIBUTION

- A. Following joint review, distribute copies of updated schedules to Contractor's Project site file, Subcontractors, suppliers, Architect/Engineer, Owner , and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 013216

SECTION 013223 – SURVEY AND LAYOUT DATA

PART 1 - GENERAL

1.1 STAKING

- A. The Contractor shall hire a surveyor licensed in the state the work is to be installed to provide all reference points not already established and staking. The Contractor shall protect and preserve the established staking and reference points as long as required for installation of the work and field verifications by any party. The Contractor's surveyor shall replace and accurately relocate all staking and reference points so lost, destroyed or moved.

1.2 LAYOUT OF WORK

- A. The Contractor shall lay out his work and be responsible for correct locations, elevations and dimensions of all work executed by him under this Contract. The Contractor must exercise proper precautions to verify the figures shown on the Drawings before laying out the work and will be held responsible for any error resulting from his failure to exercise such precaution. The Contractor shall insure the new construction aligns with any existing work.

END OF SECTION 013223

SECTION 013236 – VIDEO MONITORING AND DOCUMENTATION

PART 1 - GENERAL

1.1 SCOPE

- A. Provide all labor, materials, equipment, and services, and perform all operations necessary to furnish to the Owner a complete color audio-video record on a USB Flash Drive of the surface features within the proposed construction zone of influence. This record shall include, but not be limited to, all audio-video USB Flash Drives, storage cases, video logs, and indexes. The purpose of this coverage shall be to accurately document the pre-construction condition of these surface features.

1.2 QUALIFICATIONS

- A. The color audio-video documentation shall be done by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-video documentation. The firm shall furnish such information as the Owner deems necessary to determine the ability of that firm to perform the work in accordance with the Contract specifications.

1.3 PRODUCTS

- A. The color audio-video recording delivered to the Owner shall be on a high-quality USB Flash Drive.

END OF SECTION 013236

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Definitions.
- B. Submittal procedures.
- C. Construction progress schedules.
- D. Proposed product list.
- E. Product data.
- F. Shop Drawings.
- G. Samples.
- H. Other submittals.
- I. Design data.
- J. Test reports.
- K. Certificates.
- L. Manufacturer's instructions.
- M. Manufacturer's field reports.
- N. Erection Drawings.
- O. Construction photographs.
- P. Contractor review.
- Q. Architect/Engineer review.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect/Engineer's responsive action.
- B. Informational Submittals: Written and graphic information and physical Samples that do not require Architect/Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Architect/Engineer-accepted form.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify: Project, Contractor, Subcontractor and supplier, pertinent Drawing and detail number, and Specification Section number appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project, and deliver to Architect/Engineer through electronic submittals via email as PDF files.
- F. For each submittal for review, allow 21 days excluding delivery time to and from Contractor.
- G. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.
- H. Allow space on submittals for Contractor and Architect/Engineer review stamps.
- I. When revised for resubmission, identify changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- K. Submittals not requested will not be recognized nor processed.
- L. Incomplete Submittals: Architect/Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Architect/Engineer.
- M. Requests for substitution will be based on a case-by-case bases. Substitution requests shall be submitted with adequate information that justifies that the substitution is an equal or superior product. Failure to supply adequate information will be cause to reject the substitution requests submittal. Review of resubmitted substitution will not be recognized or processed.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Comply with Section 013216 - Construction Progress Schedule

1.5 PROPOSED PRODUCT LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

- B. For products specified only by reference standards, indicate manufacturer, trade name, model or catalog designation, and reference standards.

1.6 PRODUCT DATA

- A. Product Data: Action Submittal: Submit to Architect/Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Submit electronic submittals via Newforma Info Exchange as PDF electronic files.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution and Closeout Requirements.

1.7 SHOP DRAWINGS

- A. Shop Drawings: Action Submittal: Submit to Architect/Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual Specification Sections, provide Shop Drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
 - 1. Include signed and sealed calculations to support design.
 - 2. Submit Shop Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
 - 3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. Submit electronic submittals via Newforma Info Exchange as PDF electronic files.
- E. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution and Closeout Requirements.

1.8 SAMPLES

- A. Samples: Action Submittal: Submit to Architect/Engineer for assessing conformance with information given and design concept expressed in Contract Documents.
- B. Samples for Selection as Specified in Product Sections:
 - 1. Submit to Architect/Engineer for aesthetic, color, and finish selection.

- 2. Submit Samples of finishes, textures, and patterns for Architect/Engineer selection.
 - C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.
 - D. Include identification on each Sample, with full Project information.
 - E. Submit number of Samples specified in individual Specification Sections; Architect/Engineer will retain one Sample.
 - F. Reviewed Samples that may be used in the Work are indicated in individual Specification Sections.
 - G. Samples will not be used for testing purposes unless specifically stated in Specification Section.
 - H. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documents described in Section 017000 - Execution and Closeout Requirements.
- 1.9 OTHER SUBMITTALS
- A. Closeout Submittals: Comply with Section 017000 - Execution and Closeout Requirements.
 - B. Informational Submittal: Submit data for Architect/Engineer's knowledge as Contract administrator or for Owner.
 - C. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.
- 1.10 TEST REPORTS
- A. Informational Submittal: Submit reports for Architect/Engineer's knowledge as Contract administrator or for Owner.
 - B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.
- 1.11 CERTIFICATES
- A. Informational Submittal: Submit certification by manufacturer, installation/application Subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
 - B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - C. Certificates may be recent or previous test results on material or product but must be acceptable to Architect/Engineer.

1.12 MANUFACTURER'S INSTRUCTIONS

- A. Informational Submittal: Submit manufacturer's installation instructions for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit printed instructions for delivery, storage, assembly, installation, startup adjusting, and finishing, to Architect/Engineer in quantities specified for Product Data.
- C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER'S FIELD REPORTS

- A. Informational Submittal: Submit reports for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit report within 5 days of observation to Architect/Engineer for information.
- C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.14 ERECTION DRAWINGS

- A. Informational Submittal: Submit Drawings for Architect/Engineer's knowledge as Contract administrator or for Owner.
- B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner.

1.15 CONSTRUCTION PHOTOGRAPHS

- A. Provide photographs of site construction throughout progress of Work produced by an experienced photographer acceptable to Architect/Engineer.
- B. Submit photographs with Application for Payment.
- C. Take photographs as evidence of existing Project conditions as follows:
- D. Identify each print. Identify name of Project, orientation of view, date and time of view, name and address of photographer, and photographer's numbered identification of exposure.
- E. Digital Images: Deliver complete set of digital image electronic files on CD-ROM to Owner with Project record documents. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as sensor, uncropped.

1. Digital Images: Uncompressed TIFF format, produced by digital camera with minimum sensor size of 4.0 megapixels, and image resolution of not less than 1024 x 768 pixels.
2. Date and Time: Include date and time in filename for each image.

1.16 CONTRACTOR REVIEW

- A. Review for compliance with Contract Documents and approve submittals before transmitting to Architect/Engineer Construction Manager.
- B. Contractor: Responsible for:
 1. Determination and verification of materials including manufacturer's catalog numbers.
 2. Determination and verification of field measurements and field construction criteria.
 3. Checking and coordinating information in submittal with requirements of Work and of Contract Documents.
 4. Determination of accuracy and completeness of dimensions and quantities.
 5. Confirmation and coordination of dimensions and field conditions at Site.
 6. Construction means, techniques, sequences, and procedures.
 7. Safety precautions.
 8. Coordination and performance of Work of all trades.
- C. Stamp, sign or initial, and date each submittal to certify compliance with requirements of Contract Documents.
- D. Do not fabricate products or begin Work for which submittals are required until approved submittals have been received from Architect/Engineer.

1.17 ARCHITECT/ENGINEER REVIEW

- A. Do not make "mass submittals" to Architect/Engineer. "Mass submittals" are defined as six or more submittals or items in one day or 15 or more submittals or items in one week. If "mass submittals" are received, Architect/Engineer's review time stated above will be extended as necessary to perform proper review. Architect/Engineer will review "mass submittals" based on priority determined by Architect/Engineer after consultation with Owner and Contractor.
- B. Informational submittals and other similar data are for Architect/Engineer's information, do not require Architect/Engineer's responsive action, and will not be reviewed or returned with comment.
- C. Submittals made by Contractor that are not required by Contract Documents may be returned without action.
- D. Submittal approval does not authorize changes to Contract requirements unless accompanied by Change Order, Field Order, or Construction Change Directive.
- E. Owner may withhold monies due to Contractor to cover additional costs beyond the second submittal review.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 013300

SECTION 013319 - FIELD TEST REPORTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes, but is not limited to, services performed by an independent testing laboratory. Laboratory services covered under this section are for testing materials used for field constructed elements of the work. Performance testing of manufactured items and shop fabricated materials shall be covered under their respective specification section.
- B. All testing performed under this item shall be for the protection and benefit of the Owner and shall not be construed by the Contractor as a comprehensive quality control program intended to protect the Contractor, his subcontractors, or his suppliers. The testing frequency and types of testing shall be at the discretion of the Owner.
- C. Inspections, tests, and related actions specified in this section and elsewhere in the contract documents are not intended to limit the Contractor's own quality control procedures and testing, which facilitate overall compliance with requirements of the contract documents. Requirements for the Contractor to provide quality control services as required by the Engineer, the Owner, governing authorities, or other authorized entities are not limited by the provisions of this Section.
- D. The Contractor is required to cooperate with the independent testing laboratories performing required inspections, test, and similar services and the Engineer or his representative.
- E. Materials and installed work may require testing or retesting at any time during progress of work. Retesting of rejected materials or installed work shall be done at Contractor's expense.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.
- B. The Contract Documents may include testing requirements furnished under other Sections. Work elements which may include other testing requirements are:
 - 1. Earthwork

2. Storm sewer systems.
3. Sanitary sewer systems.
4. Water tightness of tanks.
5. Pile foundations.
6. Asphalt Concrete Paving
6. Cast-In-Place Portland Cement Concrete
7. Electrical systems tested and certified by the Electrical Contractor.

1.3 SELECTION AND PAYMENT

- A. The Contractor will employ an independent testing laboratory to perform specified testing. Payment shall be incidental to the related work bid item. The laboratory shall be mutually agreed upon by the Owner, Engineer, and Contractor.
- B. Employment of testing laboratory in no way relieves the Contractor of the obligation to perform work in accordance with requirements of the contract documents.
- C. The testing laboratory and their personnel shall be under the direction of the Engineer's on-site representative, regardless of who employs their services.

1.4 REFERENCES

- A. AASHTO T-19, Standard Method of Test for Unit Weight and Voids in Aggregate.
- B. AASHTO T-37, Standard Method of Test for Sieve Analysis of mineral Filler for Road and Paving Materials.
- C. AASHTO T-230, Standard Method of Test for Determining Degree of Pavement Compaction of Bituminous Aggregate Mixtures.
- D. ASTM C-29, Standard Method of Test for Unit Weight and Voids in Aggregate.
- E. ASTM C-31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
- F. ASTM C-33, Standard Specification for Concrete Aggregates.

- G. ASTM C-39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- H. ASTM C-40, Test Method for Organic Impurities in Fine Aggregates for Concrete.
- I. ASTM C-42, Standard Test Methods for Obtaining and Testing Drilled Cored and Sawed Beams of Concrete.
- J. ASTM C-88, Standard Test Method for Soundness of Aggregate by use of Sodium Sulfate or Magnesium Sulfate.
- K. ASTM C-94, Standard Specification for Ready-Mixed Concrete.
- L. ASTM C-117, Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing.
- M. ASTM C-136, Standard Method for Sieve Analysis of Fine and Course Aggregate.
- N. ASTM C-142, Test Method for Clay Lumps and Friable Particles in Aggregate.
- O. ASTM C-143, Standard Test Method for Slump of Hydraulic Cement Concrete.
- P. ASTM C-172, Standard Practice for Sampling Freshly Mixed Concrete.
- Q. ASTM C-173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- R. ASTM C-231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
- S. ASTM C-535, Standard Test Method for Resistance to Degradation of Large-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine.
- T. ASTM C-1064, Standard Test Method for Temperature of Freshly Mixed Portland Cement Concrete.
- U. ASTM D-698, Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb. (2.49-kg) Rammer and 12-inc. (305-mm) Drop.
- V. ASTM D-2487, Standard Test Method for Classification of Soils for engineer purposes.

- W. ASTM D-2940, Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports.
- X. ASTM D-4253, Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- Y. ASTM D-4254, Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- Z. ASTM D-4832, Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
- AA. ODOT Supplement 1021, Method of Test for Determination of the Percent of Fractured Pieces in Gravel.
- AB. ODOT Supplement 1029, Method of Test for Determining the Percentage of Deleterious Materials in Course Aggregate.
- AC. ODOT Supplement 1036, Method of Test for Determination of Percent Air Voids in Compacted Dense Bituminous Paving Mixtures.
- AD. ODOT Supplement 1044, Mix Design Method for Bituminous Aggregate Base.
- AE. Uni-Bell PVC Pipe Association UNI-B-6-98 for Low Pressure Air Testing of Installed Sewer Pipe.
- AF. ASTM – C969 – Standard practice for infiltration and exfiltration acceptance of installed concrete sewer pipe.

1.5 SUBMITTALS

- A. Prior to the start of work, submit testing laboratory name, address, and telephone number, and names of full-time specialist and responsible officer.
- B. Submit copy of the testing laboratory's evaluation report issued by one of the evaluation authorities identified in Article 1.6 of this Section with memorandum of remedies of any deficiencies reported by the inspection.
- C. Submit the chain of custody and other QA/QC procedures for each test to be utilized by the laboratory.

- D. Submit a sample test report for review by the Engineer to demonstrate conformance with Article 3.2 herein.

1.6 QUALITY ASSURANCE

- A. Except as otherwise indicated, the testing laboratory engaged shall be prequalified by the Ohio Department of Transportation for the types of services specified herein.
- B. The field personnel utilized to perform all field-testing and preparation shall be certified for those tests being performed.

1.7 RESPONSIBILITIES

A. Testing Laboratory Responsibilities:

1. Provide qualified personnel at the site. Cooperate with the Engineer and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with the specified standards.
3. Ascertain compliance of materials and mixes with requirements of the contract documents.
4. Immediately notify the Engineer and Contractor of observed irregularities or nonconformance of work or products.
5. Perform additional tests required by the Engineer.
6. Testing personnel are to report to the Engineer or his representative upon arrival on site for instructions and requirements. Prior to leaving the site, furnish the Engineer or his representative all test results whether in a formal or informal format.
7. Attend preconstruction meetings and progress meetings.

B. Contractor Responsibilities:

1. Provide access to materials proposed to be used which require testing.
2. Cooperate with laboratory personnel and provide access to the work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
 - a. To provide access to work to be tested.
 - b. To obtain and handle samples at the site or at the source of products to be tested.

- c. To facilitate tests.
 - d. To provide storage and curing of test samples as required by the testing laboratory.
4. Notify the Engineer and laboratory 24 hours prior to expected time for operations requiring testing services for scheduling purposes. Materials will not be permitted to be placed without the proper testing being performed in conformance with this Section.

1.8 LIMITS OF LABORATORY AUTHORITY

- A. The laboratory may not release, revoke, alter, or enlarge the requirements of the contract documents.
- B. The laboratory may not approve or accept any portion of the work.
- C. The laboratory may not assume any duties of the Contractor.
- D. The laboratory has no authority to stop the work.

1.9 SCHEDULE OF TESTS

Testing anticipated on this project shall include, but is not limited to:

- A. Earthwork
 - 1. Special backfill material sieve analysis per ASTM C-136, one test per source.
 - 2. On-site trench backfill analysis per ASTM D-2487, as directed by Engineer.
 - 3. Pipe bedding and cover sieve analysis per ASTM C-136, one test per source.
 - 4. Drainage fill sieve analysis per ASTM C-136, one test per source.
 - 5. Soil compaction per ASTM D-698.
 - a. Embankment testing shall be at least one (1) test/5,000 S.F. of each lift;
 - b. Trench backfill testing shall be at least one (1) test/50 L.F. of each lift;
 - c. Subgrade and/or subbase testing shall be at least one (1) test/200 L.F. of pavement or 5,000 S.F. of slabs subject to greater frequency due to soil conditions or Engineer's direction.

6. Backfill compaction per ASTM D-4253 and D-4254, one test per 50 L.F. of each lift.
7. Low Strength Mortar testing per ASTM D-4832.

B. Concrete

1. Concrete aggregate deleterious substances per ASTM C-40, ASTM C-117, and ASTM C-142, one test per source.
2. Concrete aggregate abrasion per ASTM C-535, one test per source.
3. Sodium sulfate soundness of coarse aggregate per ASTM C-88, one test per source.
4. Sampling Fresh Concrete: ASTM C-172, except modified for slump to comply with ASTM C 94.
 - a. When cylinders and/or beam samples are made, the slumps and air test shall be made using concrete from the same batch.
 - b. Slump: ASTM C-143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - c. Air Content: ASTM C-173, volumetric method of lightweight concrete; ASTM C-231 pressure method for normal weight concrete; at least one for each pour of each type of air-entrained concrete, and each time a set of compression test specimens is made.
 - d. Concrete Temperature: ASTM C-1064, test hourly when air temperature is 40° F. (4° C.) and below, and when 80° F. (27° C.) and above; and each time a set of compression test specimens is made.
 - e. Compression Test Specimen: ASTM C-31; one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 - f. Compressive Strength Tests: ASTM C-39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 50 cubic yards over and above the first 25 cubic yards of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days.

- i. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 - ii. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.
- g. Two (2) tests beams shall be made for each 250 square yards of concrete pavement and/or slabs on grade placed.
 - i. For traffic to be allowed on pavement or slab, the modulus of rupture shall be a minimum of 600 psi for Class C concrete or 400 psi for ODOT Class MS or FS.
- h. When cylinders and/or beam samples are made, the slumps and air test shall be made using concrete from the same batch.
- 5. Nondestructive Testing: Penetration resistance, sonoscope, or other nondestructive devices may be permitted but shall not be used as the sole basis for acceptance or rejection.
- 6. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.
 - a. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

C. Concrete Watertightness Testing and Repair

- 1. Liquid Containing Concrete Tanks And Channels:
 - a. Watertightness testing shall comply with ACI 350.1 and the following requirements.
 - b. Concrete tanks, basins, reservoirs and channels which have walls or slabs subjected to hydrostatic pressure shall be tested for watertightness. The tests shall be made after the structure is

complete and the concrete has achieved its specified 28-day strength, but prior to application of waterproof coating or backfill.

- c. Filling of the tank for watertightness testing shall not exceed a rate of 4 feet/hour. Fill with water to the maximum operating water surface. Keep water at this level for at least 72 hours prior to start of test.
- d. Testing includes visual inspection of the dry sides of all walls, wall base construction joint at top of the slab, and the soffit of elevated slabs for evidence of leakage. Damp spots, leakage, or seepage revealed by the test, including those caused by shrinkage of concrete, honey combed areas, construction joints, or other sources shall be repaired by Repair Method 1 (see Repair Methods paragraph in the Repair of Damaged Concrete and Cracking article above).
- e. Damp spots are defined as areas from which water that can be picked up on dry hand and smeared across the dry concrete surface.
- f. Re-test tanks or channels which have been repaired to check the suitability of repairs.
- g. Provide water required for testing and re-testing and dispose of in an approved manner.
- h. After repair of visual leakage, liquid containing or conveying concrete structures supported on soil must also meet maximum leakage criteria into the soil through their base slab or mat foundation as follows:

Structure Type	Tightness Criterion
Containment structures fully lined prior to hydrostatic test	No measurable loss
Cylindrical water and wastewater storage tanks and reservoirs other than digesters	0.050 percent per day
Digesters	0.050 percent per day (surcharged hydrostatic test)
Rectangular basins and tanks	0.050 percent per day

Concrete paved reservoirs and channels	0.10 percent per day

Note: All damp spots and/or leakage through walls, wall-to-slab joints, and elevated slabs shall first be repaired as described above.

- i. Record volume loss by measuring the vertical distance from the water surface to a fixed point on the tank above the water surface. Account for evaporation from open surfaces.
- j. If the drop in water surface during the test period exceeds the values given in the table above, exclusive of evaporation, the leakage is considered excessive and shall be remedied. The test period shall be per ACI 350.1.

D. Pavement

- 1. Aggregate base sieve analysis per ASTM D-2940, one test per source.
- 2. Sodium sulfate soundness of aggregate base per ASTM C-88, one test per source.
- 3. Percent of fractured pieces for aggregate base per ODOT Supplement 1021, one test per source.

E. Asphalt

- 1. Provide testing for mixture acceptance in accordance with Ohio Department of Transportation Procedures. The person performing the testing must have a current Level 1 Bituminous Concrete approval from ODOT.

F. Sewers

- 1. Deflection Testing
 - a. All thermoplastic gravity sanitary sewer pipe shall be tested for allowable deflection.
 - b. Deflection tests shall be performed before final acceptance and no sooner than thirty (30) days after installation of final backfill
 - c. Maximum allowable pipe deflection shall be five (5) percent of the average inside diameter for the size and class of pipe specified.
 - d. Acceptance testing shall be performed with a non-adjustable “go, no-go” mandrel with a minimum of eight (8) contact points.

Adjustable mandrels for acceptance testing shall be used only with permission of the Engineer.

- e. The mandrel size shall be ninety-five (95) percent of the average inside diameter for the size and class of pipe specified.
- f. If the "go, no-go" mandrel will not pass through a section of pipe a deflector or adjustable mandrel may be used to determine the extent and/or severity of the non-acceptable area. A "go, no-go" mandrel shall be re-run through the pipe section for final acceptance testing at no additional cost to the Owner.
- g. The Contractor or subcontractor performing the test shall be experienced and qualified to perform deflection testing with the equipment and procedures utilized. The contractor shall provide all labor, materials, tools and equipment necessary to clean and test all sections of sewer pipe, locate deficient areas, repair, deficient areas, and retest all repaired areas.
- h. All sewer runs shall be cleaned prior to testing.
- i. The acceptance test shall be performed without mechanical pulling devices.
- j. All pipe failing the deflection test shall be exposed, repaired or replaced and retested at no additional cost to the Owner.

2. Leakage Testing

- a. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- b. The Contractor shall perform sufficient tests to determine that the installation of all pipe materials have been as specified and that test results are in accordance with those required for approval of the installation.
- c. The Contractor shall furnish all pressure gauges, suitable pump or pumps, pipes, test heads, and any other apparatus and materials used for these tests. These tests are to be considered as part of the work, and no additional compensation shall be made.
- d. The tests shall be conducted under the direction of the Engineer or an appointed agent. Any testing done without direction and supervision as specified shall not be considered as a proper means of approval.

- e. The Contractor may obtain water for testing as may be required by observing the rules and regulations enforced in the municipality in which the work is being done.
- f. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

3. Infiltration and Exfiltration Testing

- a. All sewers shall be tested using an exfiltration test or, where specifically allowed in writing by the Engineer, an infiltration test.
- b. All sewers shall be tested. No visible leakage in the sewers or manholes shall be permitted.
- c. Bulkheads shall be used to isolate the test sections as required to perform the work. All service laterals, stubs and fittings shall be plugged or capped at the connection to the test section.
- d. Each manhole run shall be tested separately.

4. Exfiltration Testing

- a. The test shall be performed first with a minimum head of water of three (3) feet above the top of the high end of the sewer or two (2) feet above the high end of the highest lateral in the section or sections to be tested, or three (3) feet above the existing groundwater elevation, whichever is higher.
- b. The exfiltration test shall be conducted between two manholes by sealing the downstream end of the test section and all inlet sewers at the upstream manhole with pipe stoppers.
- c. The average internal pressure in the system shall not exceed 11.6 feet of water or 5 psi and the maximum internal pipe pressure at the lowest end shall not exceed 23 feet of water or 10 psi.
- d. Water shall be added to the pipe section at a steady rate from the upstream manhole to allow air to escape from the sewer until the water is at the specified level above the crown of the pipe. The water may stand in the pipe and manhole up to seventy-two (72) hours prior to measurement of leakage to allow for absorption by the pipe and bleeding of air. After absorption into the pipe and manhole has stabilized, the water in the upstream manhole shall be brought to test level.
- e. The leakage rate shall be determined by measurement of the drop in water elevation measured in the upstream manhole and the loss of

water calculated. The test period shall be a minimum of sixty (60) minutes duration. Use the following table to determine loss of water as measured in the manhole:

Water Level Change in Test Manhole		Volume of Leakage	
		4 Ft. Dia. MH	5 Ft. Dia. MH
(Inches)	(Feet)	(Gals.)	(Gals.)
1/8	0.01	0.98	1.53
1/4	0.02	1.96	3.06
3/8	0.03	2.94	4.59
1/2	0.04	3.92	6.12
5/8	0.05	4.90	7.65
3/4	0.06	5.87	9.18
7/8	0.07	6.85	10.71
1	0.08	7.83	12.24
1-1/8	0.09	8.81	13.77
1-1/4	0.10	9.79	15.30
1-3/8	0.11	10.77	16.83
1-1/2	0.12	11.75	18.36
1-5/8	0.13	12.72	19.89
1-3/4	0.14	13.71	21.42
1-7/8	0.16	14.69	22.90
2	0.17	15.67	24.48

5. Infiltration Testing

- a. An infiltration test shall be conducted for all sections of sewer, only when the ground water level is two (2) feet or more above the

elevation of the inside crown of pipe at the upstream limit of the section being tested.

- b. The use of well point pumps or other dewatering devices shall have been discontinued for 24 hours prior to testing to permit the groundwater table to return to a static condition.
- c. The leakage rate shall be measured by a weir, by determination of the time required to fill a container of known volume, or other measuring device approved by the Engineer in the lower end of the sewer section to be tested.
- d. The incoming sewer or sewers in the upper end of the test section shall be securely sealed.

6. Allowable Leakage

- a. The maximum allowable leakage for either infiltration or exfiltration shall be 50 gallons per inch of internal pipe diameter per mile per day.
- b. If actual leakage measured exceeds the limits specified, the Contractor must locate and repair or remove and replace the defective pipe sections to the satisfaction of the Engineer and retest the section accordingly at no additional cost to the Owner.
- c. All sanitary manholes shall be tested separately by using an exfiltration test (or infiltration test where groundwater conditions permit) to two (2) feet above the highest joint with no measurable leakage for a one hour test.

7. Low Pressure Air Testing

- a. PVC sanitary sewers 54-inch diameter and less may be air tested as specified. If the groundwater level is two (2) feet or more above the top of the pipe at the upstream end or if the air pressure required for the test is greater than 5 psig, the air test method should not be used for RCP sanitary sewers.
- b. Each manhole run shall be tested separately, unless otherwise approved by the Engineer, as the construction progresses. Backfill shall be brought to final grade before testing. Testing shall be done prior to surface restoration, and preferably with not more than four (4) manhole runs constructed ahead of testing.
- c. Test equipment consists of valves and pressure gages to control airflow and to monitor pressure within the test section.

- d. The sewer shall be flushed and cleaned prior to testing to clean out any debris. The pipe surface should be wet for more consistent results.
- e. The section of pipe to be tested shall be plugged at each end and the ends of laterals, stubs and fittings to be included in the test section shall be plugged and securely braced to prevent air leakage, and possible blowouts.
- f. Equipment used shall meet the following minimum requirements and be approved by the Engineer:
 - i. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
 - ii. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
 - iii. All air used shall pass through a single control panel.
 - iv. Three (3) individual hoses shall be used for the following connections:
 - a). From control panel to pneumatic plugs for inflation.
 - b). From control panel to sealed line for introducing the low pressure air.
 - c). From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.
- g. All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be used for the test. The sealed pipe shall be pressurized to 9 psig. The plugs must hold against this pressure without having to be braced. No persons shall be allowed in the alignment of the pipe during plug testing.
- h. After a manhole to manhole run of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole. Low pressure air shall be slowly introduced into this sealed line until the internal air pressure reaches approximately 4 psig greater than the average groundwater back pressure, but not greater than 9 psig for PVC pipe or 5 psig for RCP.
- i. In areas where groundwater is known to exist, the Contractor must determine the average groundwater back pressure. The Contractor

shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sanitary sewer lines entering the manhole. See Figure No. 1. This shall be done at the time the sanitary sewer line is installed or install an 8-inch diameter stand pipe outside of the manhole backfilled with a column of clean stone of 2-inch minimum diameter to subgrade. Immediately prior to the performance of the low pressure air test, the ground water back pressure shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The plastic tube shall be vertical and a measurement of the height, in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. This height, divided by 2.307, will equal the average groundwater back pressure.

- j. At least two (2) minutes shall be allowed for the air to stabilize when the specified internal air pressure has been obtained. When the pressure has stabilized and is at or above 3.5 psig, the air hose from the control panel to the air supply shall be disconnected. The portion of the line being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average groundwater back pressure calculated) shall not be less than the time in the tables in Reference Table 1.
- k. If a one (1) psi drop in pressure does not occur within the test time, the line has passed. If the pressure drop is more than one (1) psi during the test time, the line is presumed to have failed the test. If the line fails the test, segmented testing may establish the location of any leaks.
- l. The Contractor must repair the leak or remove and replace the defective pipe section and re-test the section to the satisfaction of the Engineer at no additional cost to the Owner.
- m. The pneumatic plugs must be installed in such a way as to prevent blowouts. Inasmuch as a force of 250 pounds is exerted on an 8-inch plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or a plug, which is partially deflated before the pipe pressure is released, can be dangerous.
- n. The Contractor should internally restrain or externally brace the plugs to the manhole wall as an added safety precaution throughout the test.

- o. Pressurizing equipment shall include a regulator or relief valve set at no higher than 9 psig for PVC pipe or 5 psig for RCP pipe to avoid over-pressurizing and damaging an otherwise acceptable line.
 - p. No one shall be allowed in the trench or manholes during testing.
 - q. Plugs shall not be removed until all pressure has been released.
 - r. All sanitary manholes shall be tested separately by using an exfiltration test (or infiltration test where groundwater conditions permit) to two (2) feet above the highest joint with no measurable leakage for a one hour test.
 - s. The air test data sheet marked Exhibit "A" at the end of this section shall be filled out for each section of piping tested in this manner.
 - t. Testing concrete pipe sewer lines by the low pressure air test method will be per ASTM C924-02 and C1103.
8. Hydrostatic Testing – Pressure Pipe, For Watermain and Force Main
- a. The pipe to be tested must be sufficiently backfilled to prevent movement while under test pressure.
 - b. Joint restraint at fittings should be permanent and constructed to withstand test pressure. If concrete thrust blocks are used, sufficient time must be allowed before testing to permit the concrete to cure. A cure time of seven (7) days is recommended when Type I Portland Cement is used; three (3) days is recommended when Type III high-early Portland Cement is used.
 - c. Test ends should be restrained to withstand the appreciable thrusts that are developed under test pressure.
 - d. Air pressure testing of installed pressure pipe is expressly prohibited.
 - e. Any testing performed without the knowledge of the Engineer shall not be considered a test for the purpose of this specification.
 - f. The hydrostatic testing sheet marked "Exhibit D" following this section shall be filled out for each section of piping tested in this manner.
 - g. After the pipe has been installed and partially backfilled (if applicable) subject all newly installed pipe, or any valved sections of it in such lengths of the force main as determined by the responsible agency, unless otherwise specified, to a hydrostatic pressure test equal to 1-1/2

times the line working pressure (50% over the working pressure) but not less than 1.25 times the working pressure at the highest point along the test section; but, in no case, shall such force mains be tested at less than 150 pounds per square inch.. The duration of each test shall be at least 2 hours.

- h. Each section of pipeline shall be slowly filled with water and the specified test pressure, measured at the point of lowest elevation, shall be applied by means of a booster pump connected to the pipe in a manner satisfactory to the Engineer. The duration of the test shall be for a minimum of sixty (60) minutes.
- i. No pipe installation will be accepted unless the leakage rate for the section of pipe being tested does not exceed a rate as shown on hydrostatic test chart, during a 24-hour test duration.
- j. The Contractor shall furnish suitable means for determining the quantity of water lost by leakage during the test.

9. Manhole Vacuum Testing

- a. Temporarily plug all pipe entering the manhole. Each plug must be installed at a location beyond the manhole/pipe gasket (i.e. outside the manhole wall), and shall be braced to prevent the plug or pipe from being drawn into the Manhole.
- b. The test head shall be placed inside the rim of the cast iron frame at the top of the manhole and inflated, in accordance with the manufacturer's recommendations.
- c. A vacuum of at least 10 inches of mercury (10" Hg) shall be drawn on the manhole. Shut the line on the vacuum line to the manhole and shut off the pump or disconnect the vacuum line from the pump.
- d. The pressure gauge shall be liquid filled, having a 3.5" diameter face with a reading from zero to thirty inches of mercury.
- e. The manhole shall be considered to pass the vacuum test if the vacuum reading does not drop more than 1" Hg (i.e from 10" to 9" Hg) during the Table 1 minimum test time.
- f. If a manhole fails the vacuum test, the manhole shall be repaired with non-shrinkable grout or other material or method approved by the engineer. The manhole surfaces shall be properly prepared prior to any repairs. Once the repair material has cured according to the manufacturer's recommendations, the vacuum test shall be repeated. This process shall continue until a satisfactory test is obtained.

- g. All temporary plugs and braces shall be removed after each test.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 SEQUENCING AND SCHEDULING

- A. The Contractor shall coordinate the sequence of work activities so as to accommodate required testing and shall allow sufficient time for testing of materials by the laboratory so as to cause no delay in the work or the work of any other Contractor. In addition, the Contractor shall coordinate his work so as to avoid the necessity of removing and replacing work to accommodate inspections and tests.

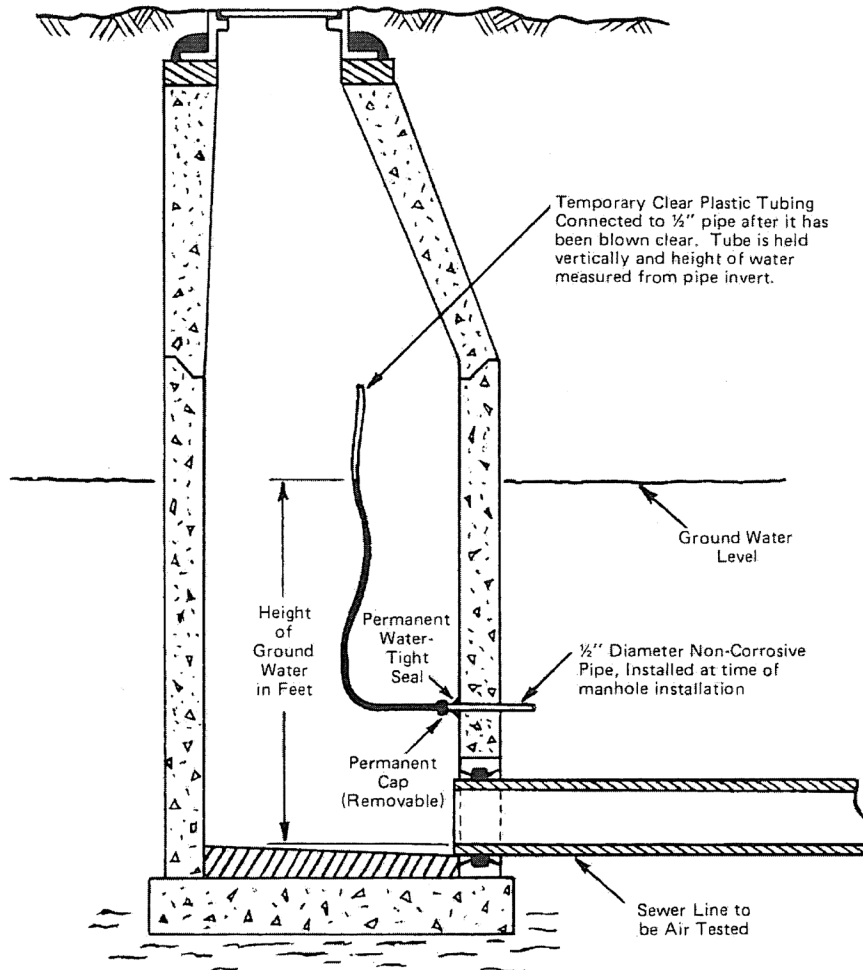
3.2 LABORATORY TEST RESULTS

- A. The testing laboratory shall submit a certified written report of each inspection, test, or similar service concurrently to the Owner, Engineer, and Contractor.
- B. Written reports of each inspection, test, or similar service shall include, but not be limited to, the following:
 - 1. Name of testing laboratory.
 - 2. Project name and construction contract reference number.
 - 3. Dates and locations of samples and tests or inspections.
 - 4. Date of report.
 - 5. Names of individuals making the inspection or test.
 - 6. Designation of the work and test method.
 - 7. Test results.
 - 8. Notation of significant ambient conditions at the time of sample taking and testing.

END OF SECTION 013319

FIGURE NO. 1

**MANHOLE CROSS-SECTIONAL VIEW
OF THE PROPER METHOD FOR
DETERMINING GROUND WATER HEIGHT**



PIPE TESTING FORM

(Note: No test shall exceed 9.0 P.S.I.G.)

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TABLE I

1 Pipe Diameter (Inches)	2 Minimum Time (Min:Sec)	3 Length for Minimum Time (Ft.)	4 Time for Longer Length (Sec)	Specification Time for Length (L) Shown (Min:Sec)							
				100 Ft.	150 Ft.	200 Ft.	250 Ft.	300 Ft.	350 Ft.	400 Ft.	450 Ft.
4	3:46	597	.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	28.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427:23	498:37	569:50	641:04

Minimum specified time required for a 1.0 P.S.I.G. Pressure Drop

for size and length of pipe indicated for $Q = 0.0015$

NOTE: If there has been no leakage, (zero P.S.I.G. drop), after one hour of testing, the test shall be accepted and the test complete. (See Section 7.5)

TABLE II

Minimum specified time required for a 0.5 P.S.I.G. Pressure Drop

for size and length of pipe indicated for $Q = 0.0015$

1 Pipe Diameter (Inches)	2 Minimum Time (Min:Sec)	3 Length for Minimum Time (Ft.)	4 Time for Longer Length (Sec)	Specification Time for Length (L) Shown (Min:Sec)							
				100 Ft.	100 Ft.	100 Ft.	100 Ft.	100 Ft.	100 Ft.	100 Ft.	100 Ft.
4	1:53	597	.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:54	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:47	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	25:31	44	34.618 L	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	28:20	40	42.738 L	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

NOTE: If there has been no leakage, (zero P.S.I.G. drop), after one hour of testing, the test shall be accepted and the test complete. (See Section 7.5)

CT CONSULTANTS, INC.

HYDROSTATIC LEAKAGE TEST

JOB. NO. _____ PROJECT: _____

CONTRACTOR: _____ CLIENT: _____

WATERLINE TESTED AT: _____
(Street Name) (Station of Gauge)

FROM STATION _____ TO STATION _____ ON _____

WATERLINE SIZE _____ TYPE _____

TESTED _____, _____ AT _____ FOR _____
TOTAL L.F. PIPE SIZE PSI DURATION

ALLOWABLE LEAKAGE _____ PER 1,000 L.F. OR PER
GALS./HR. TOTAL GALS. TOTAL L.F.

1ST TEST _____, _____ AND _____
PASS / FAIL PRESSURE LOST GALLONS LOST

2ND TEST _____, _____ AND _____
PASS / FAIL PRESSURE LOST GALLONS LOST

APPROVED BY _____
(INSPECTOR)

COMMENTS:

ALLOWABLE LEAKAGE PER 1,000 FEET OF WATERMAIN:

PIPE SIZE	ALLOWABLE LEAKAGE
<u>INCH DIAMETER</u>	<u>GALS. / 1,000 FEET</u>
6	1
8	1.3
10	1.6
12	1.9
16	2.5
20	3.2
24	3.8
30	4.8
36	5.7

NOTE: IN NO CASE SHALL THE TESTED SECTION EXCEED 2,000 FEET IN LENGTH.



PROJECT:

SHEET NO. 1 OF

JOB NO.

STREET:

CONTRACTOR:

PROJECT REP:

MANHOLE VACUUM TEST

M.H. NO.	M.H. Diameter (in.)	M.H. Depth (ft.) (btm.m.h. cover to shelf)	Vacuum Required (in Hg)	Vacuum Attained (in Hg)	Vacuum Drop (in Hg)	Holding Time Required (sec.)	Pass/ Fail	Date Tested	Contractor Attest	Engineer Attest	Remarks

TABLE 1 – Minimum Test Times for Various Manhole Diameter											
Depth		Diameter, in.									
(ft)	30	33	36	42	48	54	60	66	72		
Time(s)											
8	11	12	14	17	20	23	26	29	33		
10	14	15	18	21	25	29	33	36	41		
12	17	18	21	25	30	35	39	43	49		
14	20	21	25	30	35	41	46	51	57		
16	22	24	29	34	40	46	52	58	67		
18	25	27	32	38	45	52	59	65	73		
20	28	30	35	42	50	53	65	72	81		
22	31	33	39	46	55	64	72	79	89		
24	33	36	42	51	59	64	78	87	97		
26	36	39	46	55	64	75	85	94	105		
	39	42	49	59	69	81	91	101	113		
	42	45	53	63	74	87	98	108	121		

Note: Allowable drop equals 1 in. Hg for time shown

PROJECT REP:

DATE:

SECTION 013326 – PRODUCT TESTING AND CERTIFYING

PART 1 - GENERAL

1.1 QUALITY OF MATERIALS

- A. Where the specifications call for mill or shop tests, the Contractor shall furnish duplicate copies of attested manufacturer's certificates showing details of quality or performance sufficient to demonstrate conformity to contract requirements. Mill, shop or witness tests shall be subject to view by the Engineer's representative, but the Engineer's representation shall not relieve the Contractor from the necessity of furnishing certificates specified. The Engineer shall be notified by the Contractor in writing, sufficiently in advance of the time of making tests, so that proper arrangements may be made. Waiving of witness of tests by the Engineer may be in writing only by the Engineer. All costs for travel, lodging, food and transportation that are necessary for the Engineer's representative and the Owner's representative to attend witness tests shall be included in the Contractor's bid for those item(s) specifically designated as being subject to witness testing.
- B. Unless otherwise specified, all materials, equipment and articles shall be erected, installed, applied, or connected, used, cleaned and conditioned in accordance with the printed instructions and directions of the manufacturer.
- C. The installation shall be so made that its several component parts will function together as a workable system. It shall be complete with all accessories necessary for its operation and shall be left with all equipment properly adjusted and in working order.
- D. The work shall be executed in conformity with the best practice and so as to contribute to efficiency of operation, minimum maintenance, accessibility and sightliness. It shall also be executed so that the installation will conform and accommodate itself to the building structure, its equipment and usage.
- E. Whenever in the contract documents a particular brand, make of material, device or equipment is shown or specified, such brand, make of material, device or equipment is to be regarded merely as a standard and such trade name shall be followed by "or equal".

1.2 QUALITY ASSURANCE

- A. The equipment and materials to be furnished under this Contract shall be the products of well established and reliable firms which have had ample experience for at least five (5) years in the manufacture of equipment or materials similar in design and of equal quality to that specified. If required, the manufacturer shall submit a list of installations of similar equipment which have been in successful operation for at least five (5) years.

1.3 EXPERIENCE CLAUSE REQUIREMENT AND PERFORMANCE BONDS FOR MANUFACTURER

- A. For every piece of equipment furnished under this Contract, the manufacturer will be required to have a minimum of five (5) years of experience in providing this specific type

of equipment. In lieu of this experience requirement, the manufacturer will be required to provide performance bond(s) for the faithful performance of the equipment and guarantee payment in a sum of not less than one hundred and fifty percent (150%) of the total equipment price for the completed work for that item. In the absence of verifiable experience, the manufacturer will be required to provide the performance bond(s) for the same number of years that the manufacturer was found lacking in experience from the specified five (5) year period. The performance bond(s) shall be from an approved surety company, to the satisfaction of the Owner's Law Director.

- B. Agents of bonding companies which write bonds for the performance and payment of the contract shall furnish power of attorney bearing the seal of the company, evidencing such agent's authority to execute the particular type of bond to be furnished, and evidencing also the right of the surety company to do business in the State of Ohio. Copy of this proof shall be attached to each copy of the contract.
- C. The bond shall be purchased through a surety company with a local agent upon whom service of process can be made.
- D. In event of failure of surety or co-surety, the manufacturer shall immediately furnish a new bond, as required herein. The manufacturer's bond will not be released until all provisions of the contract have been fulfilled.
- E. The surety used for the bid bond and performance bond shall be listed in the latest U.S. Treasury Circular 570 and the Penal Sums shall be within the maximum specified for such company in said Circular 570.

END OF SECTION 013326

SECTION 013543 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 UNNECESSARY NOISE, DUST AND ODORS

- A. The Contractor's performance of this contract shall be conducted so as to eliminate all unnecessary noise, dust and odors.

1.2 SEWAGE, SURFACE AND FLOOD FLOWS

- A. The Contractor shall take whatever action is necessary to provide all necessary tools, equipment and machinery to adequately handle all sewage, surface flows and flood flows which may be encountered during the performance of the work. The entire cost of and liability for handling such flows is the responsibility of the Contractor and shall be included in the price for the appropriate item.

1.3 WORK IN FREEZING WEATHER

- A. Written permission from the Engineer shall be obtained before any work is performed which, in the judgment of the Engineer, may be affected by frost, cold, or snow. When work is performed under such conditions, the Contractor shall provide facilities for heating the materials and for protecting the finished work.

1.4 POLLUTION CONTROL

- A. It shall be the responsibility of the Contractor to prevent or limit pollution of air and water resulting from his operations.
- B. The Contractor shall perform work required to prevent soil from eroding or otherwise entering onto all paved areas and into natural watercourses, ditches, and public sewer systems. This work shall conform to all local ordinances and/or regulations, if any, and if not otherwise regulated by local ordinances or regulations shall at a minimum conform to the Ohio EPA General Storm Water NPDES Permit for Construction Activities and the Ohio Department of Natural Resources Rainwater and Land Development manual. This work may consist of but not be limited to construction and continual maintenance of silt fence, bio bag filters, sedimentation traps, stilling basins, check dams, temporary seeding, temporary mulching, erosion mats and other means to clarify waters containing suspended materials from excavations, embankments, cleared and grubbed or stripped areas, stockpiles, well points, and disposal sites and shall be commensurate with the contractor's schedule, sequence of work, means and methods. If a SWPPP plan is not required for the project, the contractor shall at a minimum submit a plan of his proposed erosion control prevention methods for approval by the Owner and/or other regulatory authorities having jurisdiction prior to starting any construction activities which may cause erosion.

- C. The Contractor shall perform work required to prevent dust attributable to his operations from entering the atmosphere. Dust on unsurfaced streets or parking areas and any remaining dust on surfaced streets shall be controlled with water and/or calcium chloride dust palliative as needed.
- D. Any material removed from sanitary or storm sewers shall be disposed in accordance with all applicable regulations.

END OF SECTION 013543

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Quality control.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mockup requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.

1.2 QUALITY CONTROL

- A. Monitor quality control over suppliers, manufacturers, products, services, Site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with specified standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- C. Perform Work using persons qualified to produce required and specified quality.
- D. Products, materials, and equipment may be subject to inspection by Architect/Engineer and Owner at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with requirements of Contract Documents.
- E. Supervise performance of Work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current as of date for receiving Bids except where specific date is established by code.
- C. Obtain copies of standards and maintain on Site when required by product Specification Sections.
- D. When requirements of indicated reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, or responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference in reference documents.

1.5 LABELING

- A. Attach label from agency approved by authorities having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label:
 - 1. Model number.
 - 2. Serial number.
 - 3. Performance characteristics.
- C. Manufacturer's Nameplates, Trademarks, Logos, and Other Identifying Marks on Products: Not allowed on surfaces exposed to view in public areas, interior or exterior.

1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this Section and identified in individual product Specification Sections.
- B. Assemble and erect specified or indicated items with specified or indicated attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mockups shall be comparison standard for remaining Work.
- D. Where mockup has been accepted by Architect/Engineer and is specified in product Specification Sections to be removed, remove mockup and clear area when directed to do so by Architect/Engineer.

1.7 TESTING AND INSPECTION SERVICES

- A. Employ and pay for services of an independent testing agency or laboratory acceptable to Owner to perform specified testing.
 - 1. Before starting Work, submit testing laboratory name, address, and telephone number, and names of full-time Professional Engineer and/or specialist and responsible officer.
 - 2. Submit copy of report of laboratory facilities' inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of deficiencies reported by inspection.
- B. Independent firm will perform tests, inspections, and other services specified in individual Specification Sections and as required by Architect/Engineer.
 - 1. Laboratory: Authorized to operate in State of Ohio.
 - 2. Laboratory Staff: Maintain full-time Professional Engineer and/or specialist on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections, and source quality control may occur on or off Project Site. Perform off-Site testing as required by Architect/Engineer or Owner.
- D. Reports shall be submitted by independent firm to Architect/Engineer, Contractor, and authorities having jurisdiction, indicating observations and results of tests and compliance or noncompliance with Contract Documents.
 - 1. Submit final report indicating correction of Work previously reported as noncompliant.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours before expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional Samples and tests required for Contractor's use.
- F. Employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work according to requirements of Contract Documents.
- G. Retesting or re-inspection required because of nonconformance with specified or indicated requirements shall be performed by same independent firm on instructions from Architect/Engineer. Payment for retesting or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- H. Agency Responsibilities:
 - 1. Test Samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at Site. Cooperate with Architect/Engineer and Contractor in performance of services.

3. Perform indicated sampling and testing of products according to specified standards.
 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or nonconformance of Work or products.
 6. Perform additional tests required by Architect/Engineer.
 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Architect/Engineer, Contractor, and authorities having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
1. Date issued.
 2. Project title and number.
 3. Name of inspector.
 4. Date and time of sampling or inspection.
 5. Identification of product and Specification Section.
 6. Location in Project.
 7. Type of inspection or test.
 8. Date of test.
 9. Results of tests.
 10. Conformance with Contract Documents.
- J. Limits on Testing Authority:
1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency or laboratory may not approve or accept any portion of the Work.
 3. Agency or laboratory may not assume duties of Contractor.
 4. Agency or laboratory has no authority to stop the Work.

1.8 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual Specification Sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe Site conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, testing, adjusting, and balancing of equipment commissioning and as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer is subject to approval by Architect/Engineer.
- C. Report observations and Site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 013300 - Submittal Procedures, "Manufacturer's Field Reports" Article.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 014000

SECTION 014223 - INDUSTRY STANDARDS

PART 1 - GENERAL

1.1 ABBREVIATIONS

- A. Abbreviations, as used, designate the following:

AASHTO	-	American Association of State Highway and Transportation Officials
ACI	-	American Concrete Institute
AIEE	-	American Institute of Electrical Engineers
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
ASTM	-	American Society of Testing and Materials
AWWA	-	American Water Works Association
CMS	-	Construction and Material Specifications
NEMA	-	National Electrical Manufacturers Association
ODOT	-	Ohio Department of Transportation
ORC	-	Ohio Revised Code
UL	-	Underwriters Laboratories, Inc.

1.2 REFERENCE TO OTHER SPECIFICATIONS

- A. Where reference is made to specifications such as ASTM, AWWA or AASHTO, the latest edition shall be used, unless otherwise noted on the plans or in the specifications.

1.3 CODES AND STANDARDS

- A. All work provided for by these specifications must be installed according to the provisions of the State and local building codes, subject to inspection and acceptance by the State and local inspectors.

END OF SECTION 014223

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities:

1. Temporary electricity.
2. Temporary lighting for construction purposes.
3. Temporary heating.
4. Temporary cooling.
5. Temporary ventilation.
6. Temporary water service.
7. Temporary sanitary facilities.

B. Construction Facilities:

1. Field offices and sheds.
2. Parking.
3. Progress cleaning and waste removal.
4. Traffic regulation.

C. Temporary Controls:

1. Barriers.
2. Fencing
3. Security.
4. Water control.
5. Dust control.
6. Erosion and sediment control.
7. Noise control.
8. Pollution control.

D. Removal of utilities, facilities, and controls.

1.2 REFERENCES

A. ASTM International:

1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
3. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 TEMPORARY ELECTRICITY

- A. Owner will pay cost of energy used. Exercise measures to conserve energy. Use Owner's existing power service.
- B. Do not disrupt Owner's use of service.

1.4 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain incandescent lighting for construction operations to achieve minimum lighting levels of 2 watts/ sq ft.
- B. Provide and maintain 1 watt/ sq ft to exterior staging and storage areas after dark for security purposes.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, lamps, and the like, for specified lighting levels.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may be used during construction.

1.5 TEMPORARY HEATING

- A. Provide temporary heating devices and heat as needed to maintain specified conditions for construction operations.
- B. Owner will pay cost of temporary heat. Exercise measures to conserve energy.

1.6 TEMPORARY COOLING

- A. Provide temporary cooling devices as needed to maintain specified conditions for construction operations.
- B. Owner will pay cost for temporary cooling. Exercise measures to conserve energy.

1.7 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.8 TEMPORARY WATER SERVICE

- A. Owner will pay cost of temporary water. Exercise measures to conserve energy. Use Owner's existing water system, extended and supplemented with temporary devices as needed to maintain specified conditions for construction operations.

- B. Extend branch piping with outlets located so that water is available by hoses with threaded connections.

1.9 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Existing facility use is not permitted. Provide facilities at time of Project mobilization.

1.10 FIELD OFFICES AND SHEDS

- A. Construction: Portable or mobile buildings, or buildings constructed with floors raised aboveground, securely fixed to foundations with steps and landings at entrance doors.
 - 1. Construction: Structurally sound, secure, weathertight enclosures for office and storage spaces. Maintain during progress of Work; remove enclosures at completion of work.
- B. Environmental Control:
 - 1. Heating, Cooling, and Ventilating for Offices: Automatic equipment to maintain comfort conditions.
 - 2. Storage Spaces: Heating and ventilating as needed to maintain products according to Contract Documents; lighting for maintenance and inspection of products.
- C. Storage Areas and Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and inspection of products to suit requirements in Section 016000 - Product Requirements.
- D. Preparation: Fill and grade Sites for temporary structures sloped for drainage away from buildings.
- E. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas to same or better condition as original condition.

1.11 PARKING

- A. If Site space is not adequate, provide additional off-Site parking.
- B. Use of existing on-Site streets used for construction traffic is permitted. Tracked vehicles are not allowed on paved areas.
- C. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition.
 - 2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.

1.12 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, before enclosing spaces.
- C. Broom and vacuum clean interior areas before starting surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from Site periodically and dispose of off-site.

1.13 TRAFFIC REGULATION

- A. Signs, Signals, and Devices:
 - 1. Post-Mounted and Wall-Mounted Traffic Control and Informational Signs: As approved by authorities having jurisdiction.
 - 2. Traffic Control Signals: As approved by local jurisdictions.
 - 3. Traffic Cones, Drums, Flares, and Lights: As approved by authorities having jurisdiction.
 - 4. Flag Person Equipment: As required by authorities having jurisdiction.
- B. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
- C. Flares and Lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
- D. Haul Routes:
 - 1. Consult with authorities having jurisdiction and establish public thoroughfares to be used for haul routes and Site access.
 - 2. Confine construction traffic to designated haul routes.
 - 3. Provide traffic control at critical areas of haul routes to regulate traffic and to minimize interference with public traffic.
- E. Traffic Signs and Signals:
 - 1. Provide signs at approaches to Site and on Site, at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
 - 2. Provide, operate, and maintain traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.
 - 3. Relocate signs and signals as Work progresses, to maintain effective traffic control.
- F. Removal:
 - 1. Remove equipment and devices when no longer required.
 - 2. Repair damage caused by installation.

1.14 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and adjacent properties from damage from construction operations.
- B. Provide barricades and covered walkways required by authorities having jurisdiction for public rights-of-way.
- C. Tree and Plant Protection: Preserve and protect existing trees and plants designated to remain.
 - 1. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
 - 2. Replace trees and plants damaged by construction operations.
- D. Protect non-owned vehicular traffic, stored materials, Site, and structures from damage.

1.15 FENCING

- A. Provide 6-foot, high fence around construction Site; equip with vehicular gates with locks.

1.16 SECURITY

- A. Security Program:
 - 1. Protect Work on existing premises from theft, vandalism, and unauthorized entry.
 - 2. Initiate program at Project mobilization.
 - 3. Maintain program throughout construction period until directed by Owner.

1.17 WATER CONTROL

- A. Grade Site to drain. Maintain excavations free of water. Provide, operate, and maintain necessary pumping equipment.
- B. Protect Site from puddles or running water.

1.18 DUST CONTROL

- A. Execute Work by methods that minimize raising dust from construction operations.
- B. Provide positive means to prevent airborne dust from dispersing into atmosphere and into Owner-occupied areas.

1.19 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills from borrow and waste disposal areas. Prevent erosion and sedimentation.

- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts and clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation. Promptly apply corrective measures.

1.20 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.21 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.22 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, and materials before Final Application for Payment inspection.
- B. Remove underground installations to minimum depth of 2 feet. Grade Site as indicated on Drawings.
- C. Clean and repair damage caused by installation or use of temporary Work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 015000

SECTION 015213 - FIELD OFFICES

PART 1 - GENERAL

1.1 FIELD OFFICE

Prior to beginning the work, the Contractor shall provide one or more field offices for use by the Contractor, their subcontractors, testing firms and City field representatives. The City's field office shall meet or exceed the requirements of ODOT Item No. 619-Field Office, Type C. The field offices shall include all the required utility services. The field office shall also contain a lockable waterproof container to contain the SWPPP and appurtenances which shall be identified "SWPPP."

The Contractor shall provide and maintain the offices on the site of the work during the construction period of the contract, at which he or his authorized agent shall be present at all times while the work is in progress. Upon project completion, the Contractor shall demobilize the office and utility services.

The field office locations shall be approved by the City. These requirements shall be incidental to the contract.

1.2 AID TO THE INJURED

The Contractor shall keep in his office and on the work site, all articles necessary for giving "First Aid to the Injured." He shall also have standing arrangements for the immediate removal and hospital treatment of any employee or other person who may be injured on the work site.

END OF SECTION 015213

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.

1.2 PRODUCTS

- A. At minimum, comply with specified requirements and reference standards.
- B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.
- C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.
- D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.
- E. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products according to manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products according to manufacturer's instructions.
- B. Store products with seals and labels intact and legible.

- C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.
- D. For exterior storage of fabricated products, place products on sloped supports aboveground.
- E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Products complying with specified reference standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and complying with Specifications; no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit Request for Substitution for any manufacturer not named, according to Section 012500 - Substitution Procedures.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 016000

SECTION 017000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Examination.
- B. Preparation.
- C. Field engineering.
- D. Execution.
- E. Cutting and patching.
- F. Protecting installed construction.
- G. Starting of systems.
- H. Demonstration and instruction.
- I. Closeout procedures.
- J. Project record documents.
- K. Manual for materials and finishes.
- L. Manual for equipment and systems.
- M. Spare parts and maintenance products.
- N. Product warranties and product bonds.
- O. Final cleaning.

1.2 EXAMINATION

- A. Verify that existing Site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual Specification Sections.
- D. Verify that utility services are available with correct characteristics and in correct locations.

1.3 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance according to manufacturer's instructions.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer-required or -recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.4 FIELD ENGINEERING

- A. Employ land surveyor registered in the State of Ohio.
- B. Locate and protect survey controls and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is indicated on Drawing.
- D. Prior to beginning Work, verify and establish floor elevations of existing facilities to ensure that new Work will meet existing elevations in smooth and level alignment except where specifically detailed or indicated otherwise.
- E. Verify setbacks and easements; confirm Drawing dimensions and elevations.
- F. Provide field engineering services. Establish elevations, lines, and levels using recognized engineering survey practices.
- G. Maintain complete and accurate log of control and survey Work as Work progresses.
- H. Protect survey control points prior to starting Site Work; preserve permanent reference points during construction.
- I. Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.5 EXECUTION

- A. Comply with manufacturer's installation instructions, performing each step in sequence. Maintain one set of manufacturer's installation instructions at Project Site during installation and until completion of construction.
- B. When manufacturer's installation instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Verify that field measurements are as indicated on approved Shop Drawings or as instructed by manufacturer.

- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.
 - 1. Secure Work true to line and level and within specified tolerances, or if not specified, industry-recognized tolerances.
 - 2. Physically separate products in place and provide electrical insulation or protective coatings to prevent galvanic action or corrosion between dissimilar metals.
 - 3. Exposed Joints: Provide uniform joint width and arrange to obtain best visual effect. Refer questionable visual effect choices to Architect/Engineer for final decision.
- E. Allow for expansion of materials and building movement.
- F. Climatic Conditions and Project Status: Install each unit of Work under conditions to ensure best possible results in coordination with entire Project.
 - 1. Isolate each unit of Work from incompatible Work as necessary to prevent deterioration.
 - 2. Coordinate enclosure of Work with required inspections and tests to minimize necessity of uncovering Work for those purposes.
- G. Mounting Heights: Where not indicated, mount individual units of Work at industry-recognized standard mounting heights for particular application indicated.
 - 1. Refer questionable mounting height choices to Architect/Engineer for final decision.
 - 2. Elements Identified as Handicap Accessible: Comply with applicable codes and regulations.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.
- I. Clean and perform maintenance on installed Work as frequently as necessary through remainder of construction period. Lubricate operable components as recommended by manufacturer.

1.6 CUTTING AND PATCHING

- A. Employ skilled and experienced Installers to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting the following:
 - 1. Structural integrity of element.
 - 2. Integrity of weather-exposed or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Visual qualities of sight-exposed elements.
 - 5. Work of Owner or separate Contractor.
- C. Execute cutting, fitting, and patching, including excavation and fill. to complete Work and to accomplish the following:
 - 1. Fit the several parts together, to integrate with other Work.
 - 2. Uncover Work to install or correct ill-timed Work.
 - 3. Remove and replace defective and nonconforming Work.
 - 4. Remove samples of installed Work for testing.

- 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.
- D. Execute Work by methods to avoid damage to other Work and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products according to requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduits, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.
- J. Identify the hazardous substances or conditions exposed during the Work to Architect/Engineer for decision or remedy.

1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual Specification Sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

1.8 STARTING OF SYSTEMS

- A. Coordinate schedule for startup of various equipment and systems.
- B. Notify Engineer and Owner seven days prior to startup of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify that tests, meter readings, and electrical characteristics agree with those required by equipment or system manufacturer.

- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute startup under supervision of manufacturer's representative or Contractors' personnel according to manufacturer's instructions.
- G. When specified in individual Specification Sections, require manufacturer to provide authorized representative who will be present at Site to inspect, check, and approve equipment or system installation prior to startup and will supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 013300 - Submittal Procedures stating that equipment or system has been properly installed and is functioning correctly.

1.9 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment and instruct at the Project Site and instructed by Manufacturer's representative who is knowledgeable about the Project.
- C. Video Recordings: Provide high-quality color video recordings of demonstration and instructional sessions. Engage commercial videographer to record sessions. Include classroom instructions, demonstrations, board diagrams, and other visual aids. Include menu navigation.
- D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Use operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- F. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- H. Allot the required instruction time for each item of equipment and system as specified in individual Specification Sections.

1.10 CLOSEOUT PROCEDURES

- A. Prerequisites to Substantial Completion: Complete following items before requesting Certification of Substantial Completion, either for entire Work or for portions of Work:
 - 1. Submit maintenance manuals, Project record documents, digital images of construction photographs, video recordings, and other similar final record data in compliance with this Section.
 - 2. Complete facility startup, testing, adjusting, balancing of systems and equipment, demonstrations, and instructions to Owner's operating and maintenance personnel as specified in compliance with this Section.

3. Conduct inspection to establish basis for request that Work is substantially complete. Create comprehensive list (initial punch list) indicating items to be completed or corrected, value of incomplete or nonconforming Work, reason for being incomplete, and date of anticipated completion for each item. Include copy of list with request for Certificate of Substantial Completion.
4. Obtain and submit releases enabling Owner's full, unrestricted use of Project and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases from authorities having jurisdiction and utility companies.
5. Deliver tools, spare parts, extra stocks of material, and similar physical items to Owner.
6. Discontinue or change over and remove temporary facilities and services from Project Site, along with construction tools, mockups, and similar elements.
7. Perform final cleaning according to this Section.

B. Substantial Completion Inspection:

1. When Contractor considers Work to be substantially complete, submit to Engineer.
 - a. Written certificate that Work, or designated portion, is substantially complete.
 - b. List of items to be completed or corrected (initial punch list).
2. Within seven days after receipt of request for Substantial Completion, Engineer will make inspection to determine whether Work or designated portion is substantially complete.
3. Should Engineer determine that Work is not substantially complete:
 - a. Engineer will promptly notify Contractor in writing, stating reasons for its opinion.
 - b. Contractor shall remedy deficiencies in Work and send second written request for Substantial Completion to Engineer
 - c. Engineer reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Engineer's inspection.
4. When Engineer finds that Work is substantially complete, Engineer will:
 - a. Prepare Certificate of Substantial Completion on EJCDC C-625 - Certificate of Substantial Completion accompanied by Contractor's list of items to be completed or corrected as verified and amended by Architect/Engineer and Owner (final punch list).
 - b. Submit Certificate to Owner and Contractor for their written acceptance of responsibilities assigned to them in Certificate.
5. After Work is substantially complete, Contractor shall:
 - a. Allow Owner occupancy of Project under provisions stated in Certificate of Substantial Completion.
 - b. Complete Work listed for completion or correction within time period stipulated.

C. Prerequisites for Final Completion: Complete following items before requesting final acceptance and final payment.

1. When Contractor considers Work to be complete, submit written certification that:

- a. Contract Documents have been reviewed.
 - b. Work has been examined for compliance with Contract Documents.
 - c. Work has been completed according to Contract Documents.
 - d. Work is completed and ready for final inspection.
- 2. Submittals: Submit following:
 - a. Final punch list indicating all items have been completed or corrected.
 - b. Final payment request with final releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 - c. Specified warranties, workmanship/maintenance bonds, maintenance agreements, and other similar documents.
 - d. Accounting statement for final changes to Contract Sum.
 - e. Contractor's affidavit of payment of debts and claims.
 - f. Consent of surety to final payment.
 - g. DBE Subcontractor Participation Forms SR-EPA 7.8 (Applicable for WPCLF & WRS�A funded projects only).
- 3. Perform final cleaning for Contractor-soiled areas according to this Section.

D. Final Completion Inspection:

- 1. Within seven days after receipt of request for final inspection, Architect/Engineer will make inspection to determine whether Work or designated portion is complete.
- 2. Should Architect/Engineer consider Work to be incomplete or defective:
 - a. Architect/Engineer will promptly notify Contractor in writing, listing incomplete or defective Work.
 - b. Contractor shall remedy stated deficiencies and send second written request to Architect/Engineer that Work is complete.
 - c. Architect/Engineer will reinspect Work.
 - d. Redo and Inspection of Deficient Work: Repeated until Work passes Architect/Engineer's inspection.

1.11 PROJECT RECORD DOCUMENTS

- A. Maintain on Site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.

- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record, at each product Section, description of actual products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates used.
 - 3. Changes made by Addenda, bulletin, Change Order, and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction as follows:
 - 1. Include Contract modifications such as Addenda, supplementary instructions, change directives, field orders, minor changes in the Work, and change orders.
 - 2. Include locations of concealed elements of the Work.
 - 3. Identify depth of buried utility lines and provide dimensions showing distances from permanent facility components that are parallel to utilities.
 - 4. Dimension ends, corners, and junctions of buried utilities to permanent facility components using triangulation.
 - 5. Identify and locate existing buried or concealed items encountered during Project.
 - 6. Measured depths of foundations in relation to finish floor datum.
 - 7. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 8. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 9. Field changes of dimension and detail.
 - 10. Details not on original Drawings.
- G. Submit marked-up paper copy documents to Architect/Engineer with claim for final Application for Payment.
- H. Submit PDF electronic files of marked-up documents to Architect/Engineer with claim for final Application for Payment.

1.12 MANUAL FOR MATERIALS AND FINISHES

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Completed volumes, with Architect/Engineer comments, will be returned after final inspection. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes within 10 days after final inspection.
- E. Submit in PDF composite electronic indexed file of final volumes within 10 days after final inspection.

- F. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom-manufactured products.
- G. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- H. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- I. Additional Requirements: As specified in individual product Specification Sections.
- J. Include listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

1.13 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect/Engineer will review draft and return one copy with comments.
- B. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.
- C. Submit one copy of completed volumes 15 days prior to final inspection. Completed volumes, with Engineer comments, will be returned after final inspection. Revise content of document sets as required prior to final submission.
- D. Submit two sets of revised final volumes within ten days after final inspection.
- E. Submit in PDF composite electronic indexed file of final volumes within ten days after final inspection.
- F. Equipment and Systems: Include description of unit or system and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.
- G. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.
- H. Include color-coded wiring diagrams as installed.
- I. Operating Procedures: Include startup, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shutdown, and emergency instructions. Include summer, winter, and special operating instructions.
- J. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

- K. Include servicing and lubrication schedule and list of lubricants required.
- L. Include manufacturer's printed operation and maintenance instructions.
- M. Include sequence of operation by controls manufacturer.
- N. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- O. Include control diagrams by controls manufacturer as installed.
- P. Include Contractor's coordination drawings indicating installed color-coded piping diagrams.
- Q. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- R. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- S. Include test and balancing reports as specified in Section 014000 - Quality Requirements.
- T. Additional Requirements: As specified in individual product Specification Sections.
- U. Include listing in table of contents for design data with tabbed dividers and space for insertion of data.

1.14 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual Specification Sections.
- B. Deliver to location as directed by Owner.

1.15 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible Subcontractors, suppliers, and manufacturers within ten days after completion of applicable item of Work.
- B. Execute and assemble transferable warranty documents and bonds from Subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include table of contents and assemble in three D side ring binder.
- F. Submit prior to final Application for Payment.
- G. Time of Submittals:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
2. Make other submittals within ten days after date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

1.16 FINAL CLEANING

- A. Execute final cleaning prior to final Project assessment.
 1. Employ experienced personnel or professional cleaning firm.
- B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces.
- C. Clean equipment and fixtures to sanitary condition with appropriate cleaning materials.
- D. Clean debris from roofs, gutters, downspouts, and drainage systems.
- E. Clean Site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish, and construction facilities from Site.

PART 2 - PRODUCTS - Not Used

PART 3 - EXECUTION - Not Used

END OF SECTION 017000

SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

PART 1 - GENERAL

- 1.1 The following forms and related sign-offs shall be documented in accordance with provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before final retainer is approved for release. Forms for Items A to E will be attached to the Contractor's executed copy of the contract.
- A. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).
 - B. Contractor's Certification of Completion.
 - C. Contractor's Affidavit of Prevailing Wage.
 - D. Consent of Surety Company for Final Payment.
 - E. Affidavit of Final Acceptance Date and Correction Period.
 - F. Before the OWNER will approve and accept the work and release the retainer, the CONTRACTOR will furnish the OWNER a written report indicating the resolution of any and all property damage claims filed with the CONTRACTOR by any party during the construction period. The information to be supplied shall include, but not be limited to, name of claimant, date filed with CONTRACTOR, name of insurance company and/or adjuster handling claim, how claim was resolved and if claim was not resolved for the full amount, a statement indicating the reason for such action.
 - G. DBE Subcontractor Participation Forms SR-EPA.7-8 (Applicable for WPCLF & WSRLA funded projects only).
 - H. Subcontractor List, Specification Section 011100 - 2 form (Applicable for CDBG funded projects only).

END OF SECTION 017800

SECTION 030000 - CONCRETE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
 - 1. Section 013319 – Field Testing Requirements
 - 2. Section 030000.02 - Expansion And Construction Joints

1.2 SUMMARY

- A. Provide all materials and labor necessary to complete all concrete, plain and reinforced, as indicated on Drawings or as specified in these specifications and as required to complete the Project. Work, without limiting the generality thereof, includes:
 - 1. Installation of concrete to provide footings, foundations, foundation walls, slabs on grade, civil work, electrical duct bank, and other incidental concrete Work.
 - 2. Concrete pads for mechanical equipment.
 - 3. Furnishing and installation of admixtures.
 - 4. Work of other trades required to be built into concrete, such as inserts for connections to steel members, waterstops, flashing reglets, anchors, embedded plates, high strength mortar, controlled low strength material, grouting of precast members, and reinforcing dowels.
 - 5. Providing vapor retarder [or waterproofing membrane] below slabs on grade.
 - 6. Finishing of concrete as specified herein or as indicated on Drawings.
- B. This Section specifies cast-in place concrete, including form work, reinforcing, mix design, placement procedures and finishes.
 - 1. Extent of concrete work is shown on drawings.
 - 2. Concrete paving and walks are specified in Division 2.
 - 3. Precast concrete is specified in other Division-3 sections.
 - 4. Mechanical finishes and concrete floor toppings are specified in other Division-3 sections.

1.3 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements and 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Product Data: Submit data for proprietary materials and items, including but not limited to, repair mortar, concrete mix design data, Portland cement, fly ash, reinforcement, forms, forming accessories, bonding agent, admixtures, patching compounds, waterstops, joint

systems, high strength repair/patching mortar, control joint/construction joint locations, curing compounds, dry-shake finish materials, and others as requested by Engineer.

1. Mix Design: Submit each proposed concrete mix design. Mix design(s) proposed shall be sealed by a Professional Engineer registered in the state of Ohio. The concrete mix design shall provide the following data:
 - a. The expected strength.
 - b. Corresponding slump before and after the introduction of mid- or high-range water-reducing admixtures.
 - c. Weights and test results of the ingredients.
 - d. Concrete mix compressive strength test results.
 - e. Other physical properties necessary to review each mix design for conformance with these specifications.
 - f. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
 - g. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
 2. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- C. Shop Drawings; Reinforcement: Submit original shop drawings prepared for fabrication, bending, and placement of concrete reinforcement. Comply with ACI Detailing Manual showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required for openings through concrete structures.
- D. Shop Drawings; Construction joint location: Submit schematical shop drawings for each structure that shows construction joints, pour sequences, waterstop locations, and waterstop information
- E. Shop Drawings; Form work: Submit shop drawings prepared by a registered Professional Engineer for fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joint or reveals, location and pattern of form tie placement, and other items which affect exposed concrete visually.
1. Submit manufacturer's data on the form snap-tie assembly including rubber type form-tie waterstop for environmental and/or below grade structures.
 2. Submit the hydrostatic pressure that the forms are capable of resisting with standard safety factors. Identify the placement rate of concrete per the forms design and the size of the structure.
 3. Engineer's review is for general architectural applications and features only. Design of form work for structural stability and efficiency is Contractor's responsibility.
- F. Samples: Submit samples of materials and products as requested by Engineer, including names, manufactures, sources, and descriptions, including but not limited to the following.
1. PVC waterstop

2. Hydrophobic waterstop
3. Chairs and/or bolsters
4. Coarse aggregate source and testing data
5. Fine aggregate source and testing data
6. Pozzolan source and testing data
7. Portland cement source and testing data
8. Form snap-ties
9. Form manufacturer
10. Reinforcing manufacturer and testing data
11. Form release agent and manufacturer
12. Grout manufacturers

G. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design tests.

1. The proposed mix design submittal(s) shall follow the procedures of Chapter 5, Sections 5.2 to 5.3 of ACI-318.
2. Reference should be made to ACI-211.5R "Guide for Submittal of Concrete Proportions" for the required submittal information. Sample forms for presenting the necessary information can be found in the addendum at the end of this section. Example Form B should follow a completed Example A in the submittal when laboratory trial batches are used to document a water-cementitious materials ratio curve.
3. Additional data summarizing the past performance records should be an integral part of the submittal if the submittal is based on past performance with the proposed materials and proportions.

H. Materials Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Materials certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, latest revisions, except where more stringent requirements are shown or specified:

1. ACI 301 "Specifications for Structural Concrete for Buildings."
2. ACI 318 "Building Code Requirements for Reinforced Concrete."
3. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
4. ACI 347 "Guide to Form work for Concrete."
5. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
6. ACI 232.3R - Report on High-Volume Fly Ash Concrete for Structural Applications.
7. ACI 305R - Guide to Hot Weather Concreting.
8. ACI 305.1 (305.1M) - Specification for Hot Weather Concreting.

9. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 10. ACI 306R - Guide to Cold Weather Concreting.
 11. ACI 308.1 (308.1M) - Specification for Curing Concrete.
 12. ACI 350.5 (350.5M) - Specifications for Environmental Concrete Structures.
 13. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 14. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
 15. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 16. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 17. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
 18. ASTM C150/C150M - Standard Specification for Portland Cement.
 19. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
 20. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete.
 21. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 22. ASTM C231/C231M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 23. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
 24. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- B. Materials and installed work may require testing and retesting at anytime during progress of work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.
- C. Engage a testing agency acceptable to Engineer to perform initial material evaluation and certification tests for mix designs and to design concrete mixes.
- D. Pre-installation Conference: Conduct conference at project site to comply with requirements of Division 1 Section "Project Meetings" and the following:
1. At least 35 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials, inspection, testing and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:
 - a. Contractor's Superintendent
 - b. Agency responsible for concrete design mixes.
 - c. Agency responsible for field quality control.
 - d. Ready-mix concrete producer.
 - e. Concrete Subcontractor

- f. Primary admixture manufactures.
- E. Concrete Testing Service: Employ and pay an independent testing laboratory, acceptable to the Owner and Architect to perform material evaluation tests and to review concrete mix designs proposed by Contractor to conform to this Specification.
- F. Alkali-Silica Reactivity Testing: Aggregates used in the concrete shall be tested by an independent testing agency for alkali-silica reactivity in accordance with ASTM C1260.

1.5 PROJECT CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301, ACI 306.1, and as follows:
 - 1. Protect concrete Work from physical damage or reduced strength caused by frost, freezing actions, or low temperatures.
 - 2. When average high and low temperature is expected to fall below 40 deg. F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 3. Do not use frozen materials or materials containing ice or snow.
 - 4. Do not place concrete in contact with surfaces less than 35 deg. F, other than reinforcing steel.
 - 5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
 - 1. Maintain concrete temperature at time of discharge not to exceed 95 deg. F.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- C. Protect adjacent finish materials against spatter during concrete placement.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 - 1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least two (2) edges and one side for tight fit.
- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Engineer's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Forms for Cylindrical Columns and Supports: Metal, fiberglass reinforced plastic, or paper or fiber tubes. Construct paper or fiber tubes of laminated plies using water-resistant adhesive with wax-impregnated exterior for weather and moisture protection. Provide units with sufficient wall thickness to resist loads imposed by wet concrete without deformation.
- E. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- F. Form Ties: Factory-fabricated, adjustable-length, snapoff metal or glass fiber-reinforced plastic form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units which will leave no metal closer than 1-1/2" to the exposed surface.
 - 1. Provide ties which, when removed, will leave holes not larger than 1" diameter in concrete surface.
 - 2. All form ties shall have a factor of safety of two (2) to determine the recommended safe working load.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Galvanized Reinforcing Bars: ASTM A 767, Class II (2.0 oz. zinc psf) hot-dip galvanized, after fabrication and bending.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 775.
 - 1. Repair of damaged epoxy-coating - When required, damaged epoxy-coating shall be repaired with patching material conforming to ASTM A 775. Repair shall be done in accordance with the patching material manufacturer's recommendations.
- D. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- E. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. (Flat sheets only)
- F. Welded Deformed Steel Wire Fabric: ASTM A 497.
- G. Epoxy - Coated Welded Wire Fabric: ASTM A884, Class A.

- H. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI specifications.
1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II, I/II, V low alkali, and ASTM C 595 blended cement Type IP for typical structures and Type MS for environmental structures.
1. Blended cements that include ASTM C 1157 cements shall not be permitted
 2. Use one brand of cement throughout project, unless otherwise acceptable to Engineer.
 - a. Different types of cement shall not be mixed or used alternately without specific written approval by the Engineer.
 - b. Different brands of cement may be used when authorized in writing by the Engineer. A resubmittal will be required if different brands are proposed during the Project.
 3. Portland cement shall contain less than 0.60 percent alkalis. Portland-pozzolan cement shall be low alkali.
- B. Concrete mixtures shall include either fly ash or slag as shown below, but within the limits stipulated in 2.4.C, unless the proposed combination of cementitious materials has been tested in accordance with ASTM C 1012 and resulted in expansion of not more than 0.10 percent at 6 months.
1. Fly Ash, conforming to ASTM C618, Class F. Limit use of fly ash to not exceed 30% of cementitious material by weight.
 - a. Fly ash pozzolan shall contain less than 1 percent by weight of carbon and less than 3 percent by weight of sulfur trioxide.
 - b. Alkali content (%Na₂O_{eq}) less than 3.0%.
 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120: Limit use of granulated blast-furnace slag to not exceed 65% of cement content by weight.
 3. The pozzolan supplied during the life of the project shall have been formed at the same single source. The pozzolan color shall not substantially alter the resulting concrete from the normal gray color and appearance.
- C. Normal Weight Aggregates: Fine and coarse aggregates shall conform to ASTM C33. Fine and coarse aggregates shall be regarded as separate ingredients.

1. Aggregates shall be non-reactive and shall be washed before use. Provide aggregates from a single source for exposed concrete.
 2. Tests for size and grading of fine and coarse aggregates shall be in accordance with ASTM C136. Combined aggregates shall be well and uniformly graded from coarse to fine sizes to produce a concrete that has optimum workability and consolidation characteristics. The final combined aggregate gradation shall be established during the design mix.
 3. For exterior exposed surfaces, do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 4. Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to Engineer.
 5. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3-mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3 mm).
- D. Fine aggregate: fine aggregate shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine. Gradation shall conform to ASTM C33.
- E. Coarse aggregate: coarse aggregate shall be hard, angular (not river washed), dense and durable gravel or crushed rock free from injurious amounts of soft and friable particles, alkali, and organic matter. Other deleterious substances shall not exceed the limits listed in ASTM C33, Table 3. Gradation of each coarse aggregate size shall conform TO ASTM C33, Table 2.
- F. Water: Conform with ASTM C94. Water for washing aggregate, for mixing and for curing shall be potable and free from oil and deleterious amounts of acids, alkalis, and organic materials; shall not contain more than 1,000 mg/l of chlorides as Cl, nor more than 1300 mg/l of sulfates as SO₄; and shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the concrete at 14 days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the concrete.
- G. Admixtures shall be compatible with the concrete and with each other. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the concrete mix.
1. Prohibited Admixtures: Calcium chloride thiocyanates or admixtures containing more than 0.1 percent chloride ions are not permitted.
- H. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Air-Mix"; Euclid Chemical Co.
 - b. "Sika Aer"; Sika Corp.
 - c. "MB-VR or MB-AE"; Master Builders.

- I. Water-Reducing Admixture: ASTM C 494, Type A, and containing not more than 0.1 percent chloride ions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "WRDA"; W.R. Grace.
 - b. "Eucon WR-75"; Euclid Chemical Co.
 - c. "Pozzolith Normal"; Master Builders.

- J. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F and containing not more than 0.1 percent chloride ions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Sikament 300"; Sika Chemical Corp.
 - b. "Eucon 37"; Euclid Chemical Co.
 - c. "Rheobuild or Polyheed"; Master Builders.

- K. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C 494, Type E, and containing not more than 0.1 percent chloride ions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Accelguard 80"; Euclid Chemical Co.
 - b. "Pozzutec 20"; Master Builders.
 - c. "Daraset"; W.R. Grace & Co.

- L. Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and containing not more than 0.1 percent chloride ions.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Pozzolith"; Master Builders.
 - b. "Eucon Retarder 75"; Euclid Chemical Co.
 - c. "Plastiment"; Sika Chemical Co.

- M. Antimicrobial crystalline waterproofing admixture: Provide Xypex Bio-San C500 admixture as manufactured by Xypex Chemical Corporation. Dosage rate shall be 1.0% by weight of total cementitious material content in the concrete. No substitution of this admixture shall be acceptable. This admixture shall be incorporated in concrete utilize in

environmental structures in accordance with manufacturer's recommendations and requirements.

- N. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Catexol 1000CL; Axim Concrete Technologies.
 - b. MCI 2000 or MCI 2005; Cortec Corporation.
 - c. DCI or DCI-S; W.R. Grace & Co., Construction Products Div.
 - d. Rheocrete 222+; Master Builders, Inc.
 - e. FerroGard-901; Sika Corporation.

- O. Fiber Reinforcement:

1. Synthetic fiber reinforcing shall be added to the concrete for the areas so indicated in the drawings. Only fibers designed and manufactured specifically for use in concrete shall be acceptable as secondary reinforcement, complying with ASTM C1116, not less than $\frac{3}{4}$ inch long.
2. The fibers may be added at the batch plant. The incorporation of said fibers shall be documented on the delivery ticket from the ready mix producer. Fibers shall be added to the concrete in strict accordance with manufacturer's printed instructions. The minimum dosage rate shall be 1.5 lbs/cubic yard.
3. Nylon fibers containing 100% virgin nylon monofilaments shall be utilized to impart a "non-hairy" surface to the finished concrete.
4. Products: Subject to compliance with requirements, provide the following fibrous reinforcement or approved equal:
 - a. Nycon Fiber; Nycon, Inc.
 - b. Nylo-Mono; Forta Corp.
 - c. Fibrasol N; Axim Concrete Technologies

2.4 RELATED MATERIALS

- A. Reglets: Where resilient or elastomeric sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gage galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Waterstops: Provide waterstops at construction joints and other joints as indicated and specified in Section 030000.02.
- C. Granular Base: Evenly graded mixture of fine and coarse aggregates to provide, when compacted, a smooth and even surface below slabs on grade.

- D. Vapor Retarder: Provide vapor retarder cover, ASTM E1745 Class C, over prepared base material where indicated below slabs on grade. Use only materials which are resistant to deterioration when tested in accordance with ASTM E 154, as follows:
1. Polyethylene sheet not less than 10 mils thick.
 2. Water resistant barrier paper consisting of heavy Kraft papers laminated together with glass fiber reinforcement and over-coated with black polyethylene on each side.
 - a. Product: Subject to compliance with requirements, provide Moistop Ultra 10 by Fortifiber Corporation, Stego Wrap 10-mil by Stego Industries or equal.
- E. Non-Shrink Grout: CRD-C 621 and ASTM C-1107, factory pre-mixed grout.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Non-metallic
 - 1) "Set Grout"; Master Builders.
 - 2) "Euco-NS"; Euclid Chemical Co.
 - 3) "Five Star Grout"; U.S. Grout Corp.
- F. Non-slip Aggregate Finish: Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rust-proof, and non-glazing, and is unaffected by freezing, moisture, and cleaning materials.
- G. Colored Wear-Resistant Finish: Packaged, dry, combination of materials, consisting of Portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground, non-fading mineral oxides, interground with cement. Color as selected by Engineer, unless otherwise indicated.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Colorcron"; Master Builders.
 - b. "Surflex"; Euclid Chemical Co.
 - c. "Lithochrome"; L.M. Scofield Co.
- H. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- I. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
1. Waterproof paper.
 2. Polyethylene film.
 3. Polyethylene-coated burlap.

- J. Liquid Membrane-Forming Curing Compound: Liquid type membrane- forming curing compound complying with ASTM C 309, Type I, Class A. Moisture loss not more than 0.55 kg./sq. m. when applied at 200 sq ft./gal.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Masterkure"; Master Builders.
 - b. "Ecocure"; Euclid Chemical Co.
 - c. "Horn Clear Seal"; A.C. Horn, Inc.
- K. Underlayment Compound: Freeflowing, self-leveling, pumpable cementitious base compound for applications from 1 inch thick to feathered edges.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Flo-Top"; Euclid Chemical Co.
 - b. "Underlayment 110," Master Builders, Inc.
 - c. "Thoro Underlayment Self-Leveling"; Thoro System Products.
- L. Bonding Compound:
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Acrylic or Styrene Butadiene:
 - 1) "Day-Chem AD Bond"; Dayton Superior Corp.
 - 2) "Everbond"; L & M Construction Chemicals.
 - 3) "SBR Latex"; Euclid Chemical Co.
- M. Epoxy Adhesive: ASTM C 881, two component material suitable for use on dry or damp surfaces. Provide material "Type," "Grade," and "Class" to suit project requirements.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Epoxite Binder 2390"; A.C. Horn, Inc.
 - b. "Sikadur 32 Hi-Mod"; Sika Chemical Corp.
 - c. "Euco Epoxy 452 or 620"; Euclid Chemical Co.
- N. High Strength Repair/Patching Mortar: Contractor can, either provide a batch/site mix or a premanufactured bag mix. See Table I for a batch/site mix.
1. premanufactured bag mix shall be polymer modified shrinkage compensated, rapid setting, high strength mortar specifically formulated to make structural repairs in vertical and overhead applications.
 2. Bag mix shall conform to ASTM C928 R2 for structural concrete repair and have a 28-day strength of at least 6,000 psi.
 3. Bag mix maybe extended with aggregate if approved by manufacturer.

4. The following are approved manufacturers::

- a. Sika Chemical Corp.
- b. Five Star Products. Inc
- c. Euclid Chemical Company
- d. CTS Cement Manufacturing Corp.
- e. Dayton Superior Corporation
- f. SpecChem

O. Color Additive for Electrical Duct Bank: The concrete for all medium voltage concrete encased conduit duct banks shall have a medium red color additive. The color additive shall have a minimum concentration per manufacturer's recommendation per yard of concrete and shall be mixed throughout the entire duct bank concrete. The color additive shall be permanent, fade resistant, and formulated to be continually exposed to groundwater.

2.5 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301 and ACI 211. If the trial batch method is used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Engineer.

- 1. Concrete shall be normal weight concrete composed of specified cement, pozzolan, admixtures, aggregates and water proportioned and mixed to produce a workable, strong, dense, and impermeable concrete.
- 2. The Contractor may substitute interground Portland-pozzolan cement conforming to ASTM C595, containing the specified amount of pozzolan in lieu of Portland cement and pozzolan. Pozzolan may be omitted in concrete exposed to normal atmospheric conditions and concrete not in contact with the ground or liquid. Water/cement ratio is based on the combined contents of cement and pozzolan in a given mix proportion.
- 3. Controlled Low Strength Material (CLSM) shall be a flowable concrete slurry mix, consisting of cement, pozzolan, water, coarse and fine aggregate. The concrete slurry mix shall be produced by a ready-mix concrete supplier.

B. Submit written reports to Engineer and Structural Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer.

C. Design mixes to provide normal weight concrete with the following properties, as indicated in Table I:

TABLE 1
CONCRETE REQUIREMENTS

Concrete Class	ASTM Coarse Aggregate Size	Maximum Water/Cement Ratio	Pozzolan, Percent by Weight of Cementitious Materials ^a	Minimum Air Content (Percent)	Minimum ^b 28-Day Compressive Strength, PSI	Slump Range Min- Max /Admix ^c (Inches)
A	57	0.43	20-28	5.5 ^c	4500	3-4/8
B	467 ^d	0.45	20-28	5.5 ^c	3500	4-5/8
E	57	0.45	20-35	5.5 ^c	3500	4-5/8
D	57 ^j	0.40	20-28	5.5 ^c	4500	3-4/8
M	78 ^j	0.40	0-20	5.5	5500	3-4/5
F	57 ^h	1.33 ^h	5-50 ^h	15 ^h	100 ⁱ	8 ^h

a Pozzolan content may be included in cementitious fraction.

b Compressive strength shall be determined at the end of 28 days based on test cylinders made and tested in accordance with ASTM C39.

c Plus or minus 1.5 percent.

d ASTM coarse aggregate gradation 57 may be substituted at Contractor's option.

e Min and max represent slump due to water only. Admix refers to recommended maximum slump for the mix after the incorporation of water reducing admixtures.

h Contractor to determine.

i Plus or minus 25 psi.

J Contractor may submit substitution for approval.

1. Typical cast-in-place structural concrete shall be Class A, except as otherwise specified or shown on the drawings.
2. Sitework, non-structural concrete (sidewalks, curbs, pavers, manhole inverts etc.) shall be Class B unless otherwise noted on the drawings.
3. Electrical duct banks shall be a Class E concrete mix. The concrete shall have a red iron oxide pigment unless otherwise changed by the owner.
4. Cast-in-place concrete for environmental structures shall be Class D, except as otherwise specified or shown on the drawings.
5. High strength repair mortar shall be class M.
6. Controlled Low Strength Material shall be Class F.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Engineer.

Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

E. Admixtures:

1. Use high range water-reducing admixture (super plasticizer) in Classes A and D concrete unless noted otherwise.
2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
3. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content within limits shown in Table I.
4. Use antimicrobial crystalline waterproofing admixture in Class environmental structures concrete.
5. Use admixtures for water-reducing and set-control in strict compliance with manufacturer's directions.
6. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as shown in Table I:
 - a. Concrete containing HRWR admixture (super-plasticizer): Not more than 8" after addition of HRWR to site-verified 2"-3" slump concrete.

2.6 CONCRETE MIXING

- A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixers of one cu. yd., or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd., or fraction thereof.
1. Provide batch ticket for each batch discharged and used in work, indicating project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
 - a. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

- C. Prepare design mixtures for each type of concrete required.
 - 1. The inclusion of either fly ash or slag in the concrete mix is mandatory.
 - 2. Where fly ash is used:
 - i. The minimum fly ash content shall be 20 percent, and the maximum shall be 30% of cementitious material by weight.
 - ii. Additional fly ash shall not be included in concrete mixed with blended cements.
 - 3. Where slag is used:
 - i. The minimum slag content shall be 50 percent and the maximum shall be 65% of cementitious material by weight.
 - ii. Additional slag shall not be included in concrete mixed with blended cements.

2.7 WATERSTOPS

A. POLYVINYL CHLORIDE (PVC):

- 1. PVC waterstops shall be manufactured from virgin polyvinyl chloride conforming to the Corps of Engineers Specification No. CRD-C572. Unless otherwise specified or noted on the drawings, waterstops in construction joints shall be 6-inch flat center/ribbed sides/0.375 inch thick, Greenstreak 679, Vinylex R6-38, or equal. Waterstops in expansion joints shall be 9 inch center-bulb/ribbed sides/0.375 inch thick, Greenstreak 696, Vinylex RB9-38H, or equal. All waterstop tees, crosses, and ells shall be factory made; all field fabricated joints will be rejected.

B. EXPANDING (HYDROPHILIC) WATERSTOPS:

- 1. Expanding waterstops shall be bentonite-free and made from unvulcanized rubber. Acceptable products include Adeka or Sika Greenstreak. Equivalents approved by the Engineer are acceptable. These are allowable for use only where indicated on the drawings or accepted in writing by the Engineer. Provide adhesive approved by the waterstop manufacturer where required due to geometry, irregular surface conditions, or as recommended by the manufacturer. Unless otherwise shown on the drawings, use Adeka MC-2010MN or Greenstreak Hydrotite CJ-1030-4M at all Hydrophilic Waterstop identified locations or approved equal.

2.8 PRODUCT DATA

A. MANUFACTURER'S DATA:

- 1. Copies of manufacturer's data shall be provided for the following:
 - a. Cement
 - b. As-delivered concrete strength, slump, temperature, and air content

- c. Final laboratory report.

B. READY-MIXED CONCRETE TRUCK DELIVERY TICKETS:

1. Each load of ready-mixed concrete delivered to the job site shall be accompanied by a delivery ticket showing the information listed in ASTM C94, Section 16.
2. With each load of concrete delivered to the job there shall be furnished by the ready mixed concrete producer duplicate delivery tickets, one for the Contractor and one for the Engineer. Delivery tickets shall provide the following information:
 - a. Date and serial number of ticket;
 - b. Name of ready mixed concrete plant;
 - c. Job location;
 - d. Contractor;
 - e. Type and brand name of cement;
 - f. Mix number or specified cement content in bags per cubic yard of concrete;
 - g. Truck number;
 - h. Time dispatched stamped by a time clock;
 - i. Amount of concrete in load in cubic yards;
 - j. Admixtures in concrete, if any;
 - k. Maximum size of aggregate;
 - l. Water added at job, if any;
 - m. Slump of concrete ordered

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials and vapor retarders with placement of forms and reinforcing steel.

3.2 FORMS

- A. Design, erect, support, brace, and maintain form work to support vertical and lateral, static, and dynamic loads that might be applied until such loads can be supported by concrete structure. Construct form work so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain form work construction tolerances complying with ACI 347.
- B. Design form work to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
- C. Construct forms to sizes, shapes, lines, and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work.

Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
- E. Provide temporary openings where interior area of form work is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.
- F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades: Provide openings in concrete form work to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retightening forms and bracing after concrete placement if required to eliminate mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER INSTALLATION

- A. Following leveling and tamping of granular base for slabs on grade, place vapor retarder sheeting with longest dimension parallel with direction of pour.
- B. Lap joints 6" and seal with manufacturer's recommended mastic or pressure-sensitive tape.

3.4 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

- C. Accurately position, support, and secure reinforcement against displacement by form work, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
- D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in longest lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints as indicated or, if not indicated, locate so as not to impair strength and appearance of the structure, as acceptable to Engineer.
 - 1. Provide a roughen interface with a 1/4", min, amplitude at construction joints in walls, slabs, and between walls and footings.
 - 2. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints, except as otherwise indicated.
- B. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
- C. Isolation Joints in Slabs-on-Ground: Construct isolation joints in slabs-on-ground at points of contact between slabs-on-ground and vertical surfaces, such as column pedestals, foundation walls, grade beams, and elsewhere as indicated.
 - 1. Joint filler and sealant materials are specified in Section 030000.02 of these specifications.
- D. Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use inserts 1/4 of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic strips into fresh concrete until top surface of strip is flush with slab surface.
 - 2. Follow the directions of Insert Manufacturer for finishing the slab and joints.
- E. If joint pattern not shown, provide joints not exceeding 15' in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third-bays).

1. Joint sealant material is specified in Section 030000.02 of these specifications.

3.6 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached thereto. Electrical conduit shall not be embedded in concrete.
- B. Install reglets to receive top edge of foundation sheet waterproofing, and to receive thru-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units to support screed strips using strike-off templates or compacting type screeds.

3.7 PREPARATION OF FORM SURFACES

- A. Clean re-used forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.
- B. Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- C. Thin form-coating compounds only with thinning agent of type, amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.
- D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel form work is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Preplacement Inspection: Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.
 1. Apply temporary protective covering to lower 2' of finished walls adjacent to poured floor slabs and similar conditions, and guard against spattering during placement.

- B. General: Comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," and as herein specified.
1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.
- C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309.
 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.
1. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 3. Maintain reinforcing in proper position on chairs during concrete placement operations.
- E. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C), and not more than 80 deg F (27 deg C) at point of placement.
 - a. The concrete shall be maintained within this temperature range for not less than seven (7) days.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials or against cold reinforcing steel.
 3. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
- F. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated to total amount of mixing water. Use of liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.
 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineers.

3.9 FINISH OF FORMED SURFACES

- A. Rough Form Finish: For formed concrete surfaces not exposed-to- view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.
- B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system. This is an as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed; provide smooth rubbed finish to smooth form finish. Refer to "Concrete Surface Repairs."
- C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment.
1. Scarify or roughen entire surface by grinding or similar effective means.
 2. Combined one part Portland cement to 1-1/2 parts fine sand by volume and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.

3. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
 4. Repeat the above process if necessary to fill voids or bug holes and obtain a consistent match to adjacent surfaces, subject to acceptance of the Engineer.
- D. Grout Cleaned Finish: Provide grout cleaned finish on scheduled concrete surfaces which have received smooth form finish treatment.
1. Scarify or roughen entire surface by grinding or similar effective means.
 2. Apply Thoroseal plaster mix coating by Thoro System Products or approved equivalent with an approximate thickness of 1/8-inch to 1/4-inch.
 3. Follow the manufacturer's recommendations and guidelines regarding surface preparation, application methods and curing.
 4. Repeat the above process if necessary to fill voids or bug holes and obtain a consistent match to adjacent surfaces, subject to acceptance of the Engineer.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, Portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
1. After placing slabs, plane surface to tolerances for floor flatness F(F) 15 and floor levelness F(L) 13, measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both, Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to tolerances of F(F) 18 F(L) 15. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

- C. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or other thin film finish coating system.
1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with surface leveled to tolerances of F(F), 20 and F(L) 17, measured according to ASTM E1155. Grind smooth surface defects which would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified, then immediately follow with slightly scarifying surface by fine brooming.
- E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- F. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and elsewhere as indicated.
1. After completion of float finishing, and before starting trowel finish, uniformly spread 25 lbs. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.
 2. After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.
- G. Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surface indicated.
1. Apply dry shake materials for colored wear-resistant finish at rate of not less than 100 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.
 2. Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material with overlapping applications, and embed by power floating.
 3. After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer. Apply curing compound immediately after final finishing.

3.11 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete from rapid moisture loss before and during finishing operations.
 - 1. The evaporation graph, Figure 1, of ACI 308 - Curing Concrete, shall be used to determine the evaporation rate during concrete placement. If the rate of evaporation equals or exceeds 0.2 lbs/sq.ft./hr., steps shall be taken to prevent excessive evaporation from the surface.
 - 2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing.
 - a. Initial curing may be any of the methods listed herein that maintain a satisfactory moisture content and temperature.
 - 3. Begin final curing procedures, if they differ from initial curing, immediately following initial curing and before concrete has dried. Continue curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of all structural concrete as herein specified.
 - 1. Provide moisture curing by following methods.
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
 - 2. Provide moisture-cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- C. Provide curing and sealing compound to pavement, walks, and curbs only, as follows:
 - 1. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours) and after surface water sheen has disappeared. Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within three (3) hours after initial application. Maintain continuity of coating and repair damage during curing period.

- D. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- E. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by moist curing methods.
 - 1. Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

3.12 SHORES AND SUPPORTS

- A. Comply with ACI 347 for shoring and reshoring in multistory construction, and as herein specified.
- B. Extend shoring from ground to roof for structures four (4) stories or less, unless otherwise permitted.
- C. Extend shoring at least three (3) floors under floor or roof being placed for structures over four (4) stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.
- D. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.
 - 1. Keep reshores in place a minimum of 15 days after placing upper tier, and longer if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.13 REMOVAL OF FORMS

- A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for five (5) days after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens

representative of concrete location or members. Lab cured cylinders will not be considered.

- C. Form facing material may be removed five (5) days after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.14 RE-USE OF FORMS

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

3.15 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.
 - 1. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions, unless otherwise indicated.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and finish concrete surfaces as scheduled. Cure concrete as herein specified.
- E. Reinforced Masonry: Provide concrete grout conforming to ASTM C476 for reinforced masonry lintels and bond beams where indicated on drawings and as scheduled. Maintain accurate location of reinforcing steel during concrete placement.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.
1. Saw-cut out honeycomb, rock pockets, voids over 1/4" in any dimension, down to solid concrete but, in no case to a depth of less than 1." Make edges of cuts slightly undercut to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.
 2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with Portland Cement patching mortar, or precast cement cone plugs secured in place with bonding agent. When other materials are used, apply them in accordance with manufacturer's recommendations.
1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
 2. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness using a template having required slope.
 3. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
 4. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
 5. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.
 6. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and

finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
8. Perform structural repairs with prior approval of Engineer or Structural Engineer for method and procedure, using specified epoxy adhesive and mortar.
9. Repair methods not specified above may be used, subject to acceptance of Engineer.
10. Underlayment Application: Leveling of floors for subsequent finishes may be achieved by use of specified underlayment material.

3.17 THROUGH SECTION CONCRETE CRACK REPAIRS

A. Sealing through wall or slab cracks.

1. Seal cracks for a water-tight or structurally bonded repair with epoxy or chemical grouting procedures.
 - a. The Contractor shall make proper repairs with epoxy injection or chemical injection with a moisture reactive hydrophilic polyurethane foam grout, as directed by the Engineer.

ADDENDUM
EXAMPLE FORM A

CONCRETE SUPPLIER: _____

PROJECT: _____ CONTRACTOR: _____

MIXTURE ID: _____ SPECIFIED f'c: _____ PSI

MATERIAL MIXTURE PROPORTIONS lbs-mass/cu.yd. (pcy)

1.0 Cement Type _____ Source: _____

Sp. Gr. _____ pcy _____ cu. ft.

1.1 Other Cementitious Materials: _____ Class: _____ Source: _____

Sp. Gr. _____ pcy _____ cu. ft.

2.0 Aggregate (No. 1) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ cu. ft.

Dry Rodded Unit Wt.: _____ pcf

Alternate (No. 1) Lightweight Aggregate Type: _____ Size: _____ Source: _____

Sp. Gr. Factor _____ over dry pcy _____ cu. ft.

Loose Unit Wt. _____ pcf Estimated Wet _____ pcf

2.1 Aggregate (No. 2) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ cu. ft.

Dry Rodded Unit Wt.: _____ pcf (If Fine Sized - FM _____)

2.2 Aggregate (Nos. 3, 4, n) Type: _____ Size: _____ Source: _____

SSD Sp. Gr. _____ pcy _____ cu. ft.

Dry Rodded Unit Wt.: _____ pcf

3.0 Water: _____ gal. _____ pcy _____ cu. ft.

EXAMPLE FORM A (CONTINUED)

4.0 Admixtures expressed as fluid ounces/cubic yard, and estimated range

Source: _____ Name: _____ Type _____ oz

Source: _____ Name: _____ Type _____ oz

Source: _____ Name: _____ Type _____ oz

Total Admixture Liquid Vol. _____ cu. ft.

(*) Note: Show volume in 4.0 if not included in cubic feet of air or water.

5.0 Other Materials - fibers, color pigment or other additions

Sp. Gr. _____ pcy _____ cu. ft.

Total Mixture Mass and Volume: _____ pcy _____ cu. ft.

Fresh Concrete Properties

Coarse & Fine Aggregate Gradation

Percent Passing

Slump _____ +/- _____ in.	Sieve Size	Aggregate No.				
		1	2	3	4	Combined
Unit Weight _____ pcf	2 in.	_____	_____	_____	_____	_____
Air Content _____ +/- _____ %	1-1/2 in.	_____	_____	_____	_____	_____
	1 in.	_____	_____	_____	_____	_____
	3/4 in.	_____	_____	_____	_____	_____
	1/2 in.	_____	_____	_____	_____	_____
	3/8 in.	_____	_____	_____	_____	_____
If Trail Batch Data -	No. 4	_____	_____	_____	_____	_____
Identify Batch No. _____	No. 8	_____	_____	_____	_____	_____
Batch Date _____	No. 16	_____	_____	_____	_____	_____
Concrete Temp. _____ °F	No. 30	_____	_____	_____	_____	_____
Comp. Strength-Average _____ °F						

EXAMPLE FORM A (CONTINUED)

7 day avg. _____ psi	No. 50	_____	_____	_____	_____	_____
28 day avg. _____ psi	No. 100	_____	_____	_____	_____	_____
	No. 200	_____	_____	_____	_____	_____

Comments: _____

Signature: _____ Date: _____

Title: _____

Organization: _____

EXAMPLE FORM B

CONCRETE SUPPLIER: _____

MATERIAL TRAIL BATCH NUMBER - proportions per cubic yard

1 2 3 4

1.0 Cement Source: _____

Type _____ lb lb lb lb

1.1 Other Cementitious Material Sources: _____

Type _____ lb lb lb lb

2.0 Aggregate No. 1 Size _____ Source: _____

SSD _____ lb lb lb lb

Alternate No. 1 Lightweight Aggregates Type _____ Source: _____

Sp. Gr. Factor _____

Oven Dry lb lb lb lb

Wet lb lb lb lb

2.1 Aggregate No. 2 Size _____ Source: _____

SSD _____ lb lb lb lb

2.2 Aggregate Nos. 3, 4, n) Size _____ Source: _____

SSD _____ lb lb lb lb

3.0 Water lb lb lb lb

4.0 Admixtures Source: _____

_____ Type _____ oz oz oz oz

_____ Type _____ oz oz oz oz

_____ Type _____ oz oz oz oz

EXAMPLE FORM B (CONTINUED)

5.0 Other Materials

_____ Type _____ lb _____ lb _____ lb _____ lb

Total Mass: _____ lb _____ lb _____ lb _____ lb

Total Mass/cy: _____ pcy _____ pcy _____ pcy _____ pcy

Relative Cubic Yard Volume: _____ cy _____ cy _____ cy _____ cy

Water-Cementitious Material Ratio:

Fresh Concrete Properties

TRAIL BATCH NUMBER

	<u>## -1</u>	<u>## -2</u>	<u>## -3</u>	<u>## -4</u>
Slump-inches	_____	_____	_____	_____
Air-Content %	_____	_____	_____	_____
Unit Wt. pcf	_____	_____	_____	_____
Concrete Temp. °F	_____	_____	_____	_____
Compressive Strength Results (ASTM C192, C39) or Other Specified Test Requirements				
7 days	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
Average (7 day)	_____	_____	_____	_____

EXAMPLE FORM B (CONTINUED)

28 days

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

Average (28 day)

_____	_____	_____	_____

Water-Cementitious Material Ratio:

_____	_____	_____	_____

Signature: _____ Date: _____

Title: _____

Organization: _____

END OF SECTION 030000

SECTION 030000.02 - EXPANSION AND CONSTRUCTION JOINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. This work includes furnishing and installing all joints where necessary.
- B. In general, the work may include the following types of joints:
 - 1. Types A, D, E, F, H and J Expansion Joint
 - 2. Types B and L Waterstop Construction Joint
 - 3. Types C and G Isolation Joints
 - 4. Type K Construction Joint
 - 5. Type CJ Control Joint
- C. Refer to the contract drawings and specifications for locations and details of the joints to be used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. The non-extruding preformed filler for joint Types A, C, D, E, F, J, L, and M shall conform to the requirements of "Standard Specifications for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction" ASTM D 1752, Type I, Sponge Rubber. Preformed filler shall be "Sponge Rubber" as manufactured by W.R. Meadows Company, Everlastic 1300 Series concrete gray sponge by Williams Products, Inc. or equal.
- B. The preformed filler for joint Type H shall conform to the requirements of ASTM D 1752, Type III, self-expanding cork. Self-expanding cork shall be as manufactured by W.R. Meadows Company, or equal.
- C. Preformed filler strips up to one (1) inch thickness shall be made as a single piece. Strips greater than one (1) inch thickness shall be fabricated by cementing together a minimum number of pieces. All cementing or vulcanizing shall be done at the point of manufacture.
- D. The joint sealer shall be cold applied in accordance with manufacturer's recommendations.
 - 1. Where the joint is not in contact with water, "No-Trak" as manufactured by A.C. Horn, Inc., "Gardox" by W.R. Meadows, Inc., or equal, shall be used.

2. Where the joint is in contact with water, "Sikaflex-IA" as manufactured by Sika Corporation, or equal shall be used.
- E. Extruded polyvinyl chloride (PVC) waterstops for Type "C" joint shall be nine (9) inches in width, not less than three-eighths (3/8) inch in thickness; Type "L" joint shall be four (4) inches wide, not less than three-sixteenths (3/16) inch in thickness; Types "G" and "J" joint shall be six (6) inches in width, not less than three-eighths (3/8) inch in thickness and all waterstops shall be of corrugated construction. Types "C", "G", and "J" shall have a center bulb and corrugated ends. The waterstops shall be made continuous by use of factory made fittings and field jointing by heat welding in accordance with the manufacturer's recommendations. PVC waterstops shall be as manufactured by Vinylex Corporation, Greenstreak Products, or equal. Provide a test report for each lot of waterstops shipped to the job site.
- F. Type "B" joints shall be as detailed on the drawings. The preformed plastic waterstops shall meet or exceed all requirements of Federal Specifications SS-S-210A, "Sealing Compound for Expansion Joints". Such preformed plastic waterstop shall be "Snyko-Flex" waterstop manufactured by Synko-Flex Products, 2100 Travis Street, Houston, Texas, or an approved equivalent.
- G. Elastomeric bearing pad in joint Type "G" shall be 50 durometer Everlastic 1200 Series Neoprene as manufactured by William Products, Inc., or equal.
- H. Type "K" joint shall be constructed as detailed on the drawings.
- I. Type "CJ" premolded insert shall be "Speed-E-Joint" by W.R. Meadows, or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Form work shall be designed to hold the preformed filler in alignment within the joint during and after concrete is poured. General description of the joints are as follows:
 1. Type "A", "D", "E" and "F" expansion joints shall consist of non-extruding preformed filler only to separate the adjoining faces of concrete without the use of a waterstop. The top shall be finished by a joint sealer for slabs. Unless otherwise shown, preformed filler shall be three-fourths (3/4) inch thick and shall be of a width equal to the faces of concrete which it is separating. Where required, the preformed filler shall be attached to concrete by the use of an approved adhesive. Apply bond breaker to edge of preformed filler material only, prior to placing joint sealer. The joint sealer shall bond only to the concrete surfaces.
 2. Type "B" waterstop construction joint shall consist of a standard construction joint and waterstop as detailed on the drawings.
 3. Types "C" and "J" joint shall consist of preformed filler material, waterstop and joint sealer as detailed on the drawings.
 4. Type "G" joint shall consist of an elastomeric bearing pad and waterstop as detailed on the drawings.

5. Type "H" joint shall consist of self-expanding cork to separate the adjoining faces of concrete without the use of a waterstop. The top shall be finished by a joint sealer.
 6. Type "CJ" Control joints shall be made by inserting a removable preformed insert to create a joint which is then filled with a joint sealer, if required.
 7. Type "K" joint shall consist of a standard construction joint, a saw cut, and joint sealer as detailed on the drawings.
- B. PVC waterstops shall be wired to the reinforcing steel every 12" to prevent misalignment during concreting.

END OF SECTION 030000.02

SECTION 034100 - PRECAST CONCRETE BUILDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide pre-fabricated, pre-cast concrete building with stamped veneer walls and concrete roofing slabs as indicated and in compliance with Contract Documents. Owner shall approve final appearance.
- B. Building to be delivered pre-assembled and placed on concrete foundation in accordance with manufacturer's recommendations, and the Ohio Building Code.
- C. Pre-fabricated precast concrete structure includes the following:
 - 1. Exterior walls
 - 2. Interior walls and ceiling – factory painted prior to shipment to the site.
 - 3. Roof slab
 - 4. Floor slab
 - 5. Foundations – designed by the building manufacturer
 - 6. Related process, mechanical and electrical components as indicated on drawings.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 117, Standard Specifications for Concrete Construction and Materials.
 - 2. ACI 301, Standard Specifications for Structural Concrete.
 - 3. ACI 304, Measuring, Mixing, Transporting, and Placing Concrete.
 - 4. ACI 309, Consolidation of Concrete.
 - 5. ACI-318-02, "Building Code Requirements for Reinforced Concrete". Concrete Reinforcing Institute, "Manual of Standard Practice".
- B. American Society for Testing and Materials International (ASTM):
 - 1. A283: Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 - 2. A307: Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
 - 3. A615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 4. C33: Standard Specification for Concrete Aggregates.
 - 5. C150: Standard Specification for Portland Cement.
 - 6. C260: Standard Specification for Air-Entraining Admixtures for Concrete.

C. Precast/Prestressed Concrete Institute (PCI)

1. Fabricator must be a certified producer/member of The Precast/Prestressed Concrete Institute (PCI), National Precast Concrete Association (NPCA) or equal.
2. Building fabricator must have a minimum of 5 years experience manufacturing and setting transportable precast concrete buildings.

D. Building Code

1. The Ohio Building Code (current edition).

1.3 DESIGN REQUIREMENTS

A. Design Loads:

1. Refer to the contract drawings for all design live loads and data for wind, seismic and snow loads.
2. Wind, seismic and snow loads shall be computed based on ASCE 7 and Ohio Building Code.

B. Shed Roof: Roof panels shall slope as indicated on drawings. The roof shall extend a minimum of 3" beyond the wall panel all around. Provide turndown feature where the roof edge extends 1/2" below the top of the wall panels to further prevent water migration into the building along top of wall panels.

C. Floor and wall panels must each be produced as single component monolithic panels. No floor or vertical wall joints will be allowed, except at corners. Wall panels shall be set on top of floor panel.

D. Interior partition walls, where indicated on the drawings, shall be constructed similar to wall panels described above.

E. Floor panel must have 1/2" step-down around the entire perimeter to prevent water migration into the building along the bottom of wall panels.

F. The floor must be designed to act as a slab on grade application, with separate foundation to be designed and submitted.

G. Coordinate all required pre-cast openings required for process, mechanical, and electrical equipment, piping, drains, panels, conduits, etc. See drawings for additional information on all systems.

H. The proposed building shall be approved by the Ohio Board of Building Standards.

1. The Contractor shall acquire the Building Permit.

1.4 SUBMITTALS:

- A. Submit the following shop drawings in accordance with Section 013300.
- B. Product Data:
 - 1. Manufacturer's specifications and instructions including Material safety Data Sheets (MSDS) for admixtures and curing materials. Manufacturer's certification of compatibility of all admixtures.
 - 2. Provide manufacturers product data for louvers, doors and hardware.
 - 3. Provide manufacturers product data for all coatings.
- C. Shop Drawings:
 - 1. Provide certificate that cement used complies with ASTM C150 and these specifications.
 - 2. Provide fabrication drawings and attachment of the various components, including reinforcement detailing, bending, and placing concrete reinforcement in compliance with ACI 318 and The Precast/Prestressed Concrete Institute (PCI).
 - 3. Provide floor plans, roof plans, elevations, sections, and dimensions for all precast concrete units including anchors, inserts, and embedded cast-in place items.
 - 4. Pre-cast openings to suit all process, mechanical and electrical systems.
 - 5. Provide drawings and structural calculations signed and sealed by a Professional Engineer registered in the State of Ohio. The drawings must include foundation and building (roof and wall) requirements. Calculations are accepted for information purposes only.
 - 6. Submit proposed painting system for factory applied paint on interior walls and ceiling.
 - 7. Submit building construction drawings and foundation requirements that have been approved by the Ohio Board of Building Standards in order to comply with local City of Eastlake building department requirements. This information shall be approved by the building department prior to ordering and installing the building.
- D. Contractor shall submit samples of exterior wall and roof facades that are available from the pre-engineered building manufacturer. As part of the submittal, add/deduct cost shall be provided for each façade over the cost of the façade that is provided in the bid. No contractor markup shall be included in the cost of each façade.

1.5 QUALITY ASSURANCE:

- A. Unless otherwise indicated, materials, workmanship, and practices shall conform to the following standards:
 - 1. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 2. Ohio Building Code.

3. Ohio Board of Building Standards

- B. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions govern.
- C. Concrete not meeting the minimum specified 28-day design strength shall be cause for rejection and removal from the work.
- D. Perform concrete work in conformance with ACI 301 unless otherwise specified.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Provide in conformance with Specification Section 016600 and as specified here.
- B. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.
- C. Store units, unless otherwise specified, with dunnage the full length of long walls of each building.
- D. Place stored units so identification marks are clearly visible, and units can be inspected.
- E. Deliver structural precast concrete units in quantities and at times to assure compliance with schedule and proper setting sequence to ensure continuity of installation.
- F. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- G. Place dunnage of even thickness between each unit.
- H. Lift and support units only at designated points shown on the Shop Drawings.

1.7 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Provide materials and products to fabricate precast concrete structures in compliance with applicable requirements and reference standards.

1. Provide pre-fabricated precast concrete structures consisting of four sided units, floor slab and roof panels. Coordinate installation of insulated metal doors, and other items as specified in this section.

2.2 ACCEPTABLE MANUFACTURERS:

- A. Norwalk Concrete Industries.
- B. Mack Industries.
- C. Easi-Set Precast Concrete Buildings.

2.3 MATERIALS:

- A. Concrete: Steel-reinforced, 5000 PSI minimum 28-day compressive strength, air entrained (ASTM C260).
- B. Reinforcing Steel: ASTM A615, grade 60 unless otherwise specified.
- C. Roof: The entire precast concrete roof panel surface must be cleaned and primed with a material that prepares the concrete surface for proper adherence to the coating material.
- D. Roofing finish material: The entire precast concrete roof panel surface shall be sealed with a .045 EPDM continuous membrane cemented to the concrete with a compound designed for this purpose.
- E. Caulking: Joint between building and floor slab shall be caulked on the exterior and interior surface of the joints. Caulking shall be SIKAFLEX-1A elastic sealant or equal. Exterior caulk joint to be 3/ 8" x 3/ 8" square so that sides of joint are parallel for correct caulk adhesion. Back of joint to be taped with bond breaking tape to ensure adhesion of caulk to parallel sides of joint and not the back.
- F. Panel Connections: All panels shall be securely fastened together with 3/8" thick steel brackets. Steel is to be of structural quality, hot-rolled carbon complying with ASTM A283, Grade C and hot dipped galvanized after fabrication. All fasteners to be 1/2" diameter bolts complying with ASTM A307 for low-carbon steel bolts. Cast-in anchors used for panel connections to be Dayton-Superior #F-63, or equal. All inserts for corner connections must be secured directly to form before casting panels. No floating-in of connection inserts shall be allowed.
- G. Building Insulation: Provide continuous rigid insulation board on walls and ceiling overlaid with steel furring channel and FRP laminated plywood panels.
- H. Perimeter Foundation Insulation: Provide continuous rigid insulation board at perimeter of building foundation. Insulation to be rigid extruded polystyrene foam, "FOAMULAR 250" as manufactured by Owens Corning Foam Insulation, or equal.

Insulation to be 3" thickness, R-15 minimum, installed for 24" minimum vertical distance.

2.4 ACCESSORIES

- A. Doors and Frames: Shall comply with Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (SDI-100) Level 2 and as herein specified. The building shall be equipped with 3'-0" x 7'-0" x 1-3/4", 18-gauge galvanized metal doors with expanded polystyrene insulation, and with 16-gauge galvanized frame. Door and frame shall be bonderized and painted one coat of rust inhibitive primer and one finish coat of enamel paint, applied per MPI standards; color shall be selected by Owner. See the drawings for door quantities, single doors, and double doors.
- B. Door Hardware
 - 1. Lock Set: Sargent - Mortise Lock 8200-04 Storeroom, Standard "B" Lever, Contemporary (CR) Rose and (CE) Escutcheon.
 - 2. Hinges: Hager BB1199 5" x 4" (stainless steel with non-removable hinge pins), 4 per door or equal US32D.
 - 3. Threshold: National Guard 897V48 raised interior, extruded aluminum threshold with neoprene seal or equal
 - 4. Door Holder: Glynn-Johnson 904H US32D (stainless steel finish), overhead slide type surface mounted door holder or equal.
 - 5. Drip Cap: National Guard 15D48 or equal.

2.5 FINISHES

- A. Interior of Building: Interior walls and roof shall be FRP laminated plywood panels.
- B. Exterior of Building: To be determined at time of submittals.

PART 3 - EXECUTION

3.1 SITE PREPARATION REQUIREMENTS:

- A. The building shall bear fully on a base foundation designed by the manufacturer.
- B. The building unit shall be set onto foundations adequately installed for this type of construction. High density plastic shims are to be placed under each building unit at intervals to achieve a setting surface level to +/- 1/8". During the installation process of the building units all wall and roof joints should be maintained flush and plumb with one and other. After final positioning of building units, all horizontal and vertical seams shall be weatherproofed. All building-to-foundation and building-to-building section

interconnections shall be installed (anchored or welded) to meet code requirements for the installation. Connections must be designed and approved by a licensed structural engineer.

- C. The building must be shipped fully assembled including walls, floors and roof. Building units should be transported to the site in a manner and with proper bracing to keep buildings from shifting or racking during the transportation process. Proper shipping protection should be used under the building units to keep any concrete floors from contacting trailer decks.
- D. Provide rigid insulation at entire perimeter foundation.
- E. Lock to man doors for building shall be set up with a temporary key cylinder during construction with temporary keys provided to the Owner. Upon completion of construction the temporary cylinder shall be removed and the doors shall be keyed to match the Owner's requirements.

3.2 CLOSEOUT ACTIVITIES:

- A. Provide in accordance with Specification Section 017000.

END OF SECTION 034100

SECTION 055000 - METAL FABRICATIONS

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. Steel framing and supports for overhead doors.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Metal bollards.
5. Loose bearing and leveling plates for applications where they are not specified in other Sections.

- B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete and masonry for applications where they are not specified in other Sections.

- C. Related Requirements:

1. Section 033053 "Miscellaneous Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 042000 "Concrete Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Paint products.
 - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Steel framing and supports for overhead doors.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 4. Metal bollards.
 - 5. Loose steel lintels.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B; 0.0677-inch (1.7-mm) minimum thickness; unfinished .

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting." and Section 099123 Interior Painting."
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface].
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where exposed to the exterior.

2.7 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
- B. If required, fabricate bollards with 3/8-inch- (9.5-mm-) thick steel baseplates for bolting to concrete slab/footing. Drill baseplates at all four corners for 3/4-inch (19-mm) anchor bolts.
 - 1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.

2.8 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.
- C. Prime plates with zinc-rich primer.

2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches (200 mm) unless otherwise indicated.
- C. Galvanize and prime loose steel lintels located in exterior walls.

2.10 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.11 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

- 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

- B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

3.3 INSTALLING METAL BOLLARDS

- A. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each bollard unless otherwise indicated.
 - 1. Embed anchors at least 4 inches (100 mm) in concrete.
- B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.

3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting." and Section 099123 "Interior Painting."

END OF SECTION 055000

SECTION 099635 - CHEMICAL-RESISTANT COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Field application of chemical-resistant coatings.
- B. Related Requirements:
 - 1. Section 055000 - Metal Fabrications: Shop-primed items.

1.2 DEFINITIONS

- A. Refer to ASTM D16 for definitions of terms used in this Section.

1.3 REFERENCE STANDARDS

- A. ASTM International:
 - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
 - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. California Department of Public Health:
 - 1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
- C. Green Seal:
 - 1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.
 - 2. GS-11 - Paints and Coatings.
- D. Master Painters Institute:
 - 1. MPI - Approved Products List.
- E. NSF International:
 - 1. NSF 61 - Drinking Water System Components - Health Effects.
- F. South Coast Air Quality Management District:

1. SCAQMD Rule 1113 - Architectural Coatings.

G. SSPC: The Society for Protective Coatings:

1. SSPC-PA 2 - Procedure for Determining Conformance to Dry Coating Thickness Requirements.
2. SSPC-SP 10 - Near-White Metal Blast Cleaning.

1.4 SEQUENCING

- A. Section 011000 - Summary: Requirements for sequencing.
- B. Do not apply finish coats unless coatable sealant has been applied.
- C. Back prime wood trim before installation of trim.

1.5 SUBMITTALS

- A. Section 013300 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
 1. Submit manufacturer data.
 2. Include MPI - Approved Products Lists with proposed products highlighted.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer Instructions: Submit special surface preparation procedures, substrate conditions requiring special attention.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Qualifications Statements:
 1. Submit qualifications for manufacturer and applicator.
 2. Submit manufacturer's approval of applicator.

1.6 CLOSEOUT SUBMITTALS

- A. Section 017000 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Submit information on cleaning, touchup, and repair of coated surfaces.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 017000 - Execution and Closeout Requirements: Requirements for maintenance materials.

1.8 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified to NSF 61.
- B. Surface Burning Characteristics:
 - 1. Fire-Retardant Finishes: Maximum 25/450 flame-spread/smoke-developed index when tested according to ASTM E84.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.
- B. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience and approved by manufacturer.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 016000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Container Labeling: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Inspection:
 - 1. Accept materials on Site in manufacturer's sealed and labeled containers.
 - 2. Inspect for damage and to verify acceptability.
- D. Store materials in ventilated area and otherwise according to manufacturer instructions.
- E. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

1.11 AMBIENT CONDITIONS

- A. Section 015000 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.
- B. Storage Conditions:
 - 1. Minimum Ambient Temperature: 45 degrees F (7 degrees C).
 - 2. Maximum Ambient Temperature: 90 degrees F (32 degrees C)

C. Application Conditions:

1. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by coating manufacturer.
2. Do not apply exterior coatings during rain or snow, when relative humidity is outside humidity ranges, or when moisture content of surfaces exceeds those required by coating manufacturer.

1.12 WARRANTY

- A. Section 017000 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five-year manufacturer's warranty for coatings.

PART 2 - PRODUCTS

2.1 COATINGS

A. Materials:

1. Coatings:
 - a. Ready mixed, except field-catalyzed coatings.
 - b. Capable of drying or curing free of streaks or sags.
2. Accessories:
 - a. Grade: Commercial.
 - b. Turpentine.
 - c. Thinners.
 - d. Other materials not specifically indicated but required to achieve specified finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for application examination.
- B. Verify that surfaces are ready to receive Work as recommended by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of Work, and report conditions capable of affecting proper application to Architect/Engineer.
- D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Moisture Content:

1. Measure moisture content of surfaces using electronic moisture meter.
2. Do not apply finishes unless moisture content of surfaces are below following maximums:
 - a. Plaster and Gypsum Wallboard: 12 percent.
 - b. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - c. Interior Wood: 15 percent, measured according to ASTM D4442.
 - d. Exterior Wood: 15 percent, measured according to ASTM D4442.
 - e. Concrete Floors: 8 percent.

3.2 PREPARATION

- A. Section 017000 - Execution and Closeout Requirements: Requirements for application preparation.
- B. Prepare coatings as follows:
1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
 2. For smooth flow and brushing properties.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Defects:
1. Correct defects and clean surfaces capable of affecting Work of this Section.
- E. Impervious Surfaces:
1. Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach.
 2. Rinse with clean water and allow surface to dry.
- F. Aluminum Surfaces Scheduled for Coating:
1. Remove surface contamination by steam or high-pressure water.
 2. Remove oxidation with acid etch and solvent washing.
 3. Apply etching primer immediately following cleaning.
- G. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Coating:
1. Remove foreign particles to permit adhesion of finishing materials.
 2. Apply compatible sealer or primer.
- H. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- I. Concrete Floors:
1. Remove contamination, acid etch, and rinse floors with clear water.

2. Verify that required acid-alkali balance is achieved.
 3. Allow to dry.
- J. Copper Surfaces Scheduled for Coating:
1. Remove contamination by steam, high-pressure water, or solvent washing.
 2. Apply vinyl-etch primer immediately following cleaning.
- K. Copper Surfaces Scheduled for Natural Oxidized Finish:
1. Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid.
 2. Rub on repeatedly for required effect, and, once attained, rinse surfaces with clear water and allow to dry.
- L. Gypsum Board Surfaces:
1. Fill minor defects with filler compound.
 2. Spot-prime defects after repair.
- M. Galvanized Surfaces:
1. Remove surface contamination and oils, and wash with solvent.
 2. Apply coat of etching primer.
- N. Concrete and Unit Masonry Surfaces Scheduled to Receive Coating:
1. Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter.
 2. Remove oil and grease with solution of tri-sodium phosphate, rinse well, and allow to dry.
 3. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water, and allow to dry.
- O. Plaster Surfaces:
1. Fill hairline cracks, small holes, and imperfections with latex patching plaster.
 2. Make smooth and flush with adjacent surfaces.
 3. Wash and neutralize high-alkali surfaces.
- P. Uncoated Steel and Iron Surfaces:
1. Remove grease, mill scale, weld splatter, dirt, and rust.
 2. If heavy coatings of scale are evident, remove by wire brushing or by sandblasting.
 3. Clean by washing with solvent.
 4. Apply treatment of phosphoric acid solution, ensuring that weld joints, bolts, and nuts are similarly cleaned.
 5. Spot-prime coat after repairs.
- Q. Shop-Primed Steel Surfaces:
1. Sand and scrape to remove loose primer and rust.
 2. Feather edges to make touchup patches inconspicuous.

3. Clean surfaces with solvent.
4. Prime bare steel surfaces.

R. Existing Work:

1. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

3.3 APPLICATION

A. Do not apply finishes to surfaces that are not dry.

B. Apply each coat to uniform appearance.

C. Apply each coat slightly darker than preceding coat, unless specified otherwise.

D. Sand surfaces lightly between coats to achieve required finish.

E. Cleaning:

1. Vacuum surfaces to remove loose particles.
2. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Finishing Mechanical and Electrical Equipment:

1. Schedule of Color-Coding and Identification Banding of Equipment, Ductwork, Piping, and Conduit: Division 26 Specifications.
2. Coat shop-primed equipment.
3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components, and coat separately.
4. Coat insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports except where these items are shop finished.
5. Coat interior surfaces of air ducts visible through grilles and louvers with one flat black coating.
6. Coat dampers exposed behind louvers, grilles to match face panels.
7. Coat exposed conduit and electrical equipment installed in finished areas.
8. Coat both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
9. Color-Coding:
 - a. Color-code equipment, piping, conduit, and exposed duct work according to indicated requirements.
 - b. Color band and identify with flow arrows, names, and numbering.
10. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings that were removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Requirements for inspecting and testing.

B. Inspecting:

1. Surface Preparation: Comply with SSPC-SP 10.

C. Testing:

1. Holiday Testing: Submerged surfaces including surfaces within vapor area.
2. Dry Film Thickness: Measure according to SSPC-PA 2.

D. Equipment Acceptance:

1. Repair or recoat areas containing holidays according to coating manufacturer instructions.
2. Retest repaired or recoated areas.

3.5 CLEANING

A. Section 017000 - Execution and Closeout Requirements: Requirements for cleaning.

B. Collect waste material that may constitute fire hazards, place in closed metal containers, and remove daily from Site.

3.6 ATTACHMENTS

A. Schedule - Ferrous Metals:

1. Application: Submerged in potable, raw, or reclaimed water, and wastewater, including surfaces within 2 feet above high water level.

- a. Surface Preparation: SSPC-SP 10.
- b. Amine-cured epoxy.
- c. Manufacturers:
 - 1) Carboline Company.
 - 2) Sherwin-Williams Company (The).
 - 3) Tnemec Inc.
 - 4) Approved Equivalent.
- d. Type: High build.
- e. Minimum Solids Content: 80 percent by volume.
- f. Number of Coats: Two.
- g. Dry Film Thickness per Coast: 3-5 mils.

2. Slide Gates and Wall Thimbles:

- a. Surface Preparation: SSPC-SP 10.
- b. Polyamide Epoxy:
- c. Manufacturers:
 - 1) Carboline Company.

- 2) Sherwin-Williams Company (The).
- 3) Tnemec Inc.
- 4) Approved Equivalent.

- d. Type: High build.
- e. Minimum Solids Content: 58 percent by volume.
- f. Number of Coats: Two.
- g. Dry Film Thickness per Coat: 2-6 mils.

B. Schedule - Concrete:

- 1. Application: Submerged in water or wastewater, including surfaces within 2 feet (0.61 m) above high water level:

- a. Surface Preparation: As recommended by coating manufacturer.
- b. Filler-Surfacer:

- 1) Polyamine epoxy.
- 2) Manufacturers:
 - a) Carbolite Company.
 - b) Sherwin-Williams Company (The).
 - c) Tnemec Inc.
 - d) Approved Equivalent.

- 3) Solids Content: 100 percent by volume.

- c. Finish Coats:

- 1) Amine-cured epoxy.
- 2) Manufacturers:
 - a) Carbolite Company.
 - b) Sherwin-Williams Company (The).
 - c) Tnemec Inc.
 - d) Approved Equivalent.
- 3) Minimum Solids Content: 80 percent by volume.
- 4) Number of Coats: Two.
- 5) Dry Film Thickness per Coat: 3-5 mils.

- 2. Application: Floor slab and walls.

- a. Surface Preparation: As recommended by coating manufacturer.
- b. Filler-Surfacer:

- 1) Polyamine epoxy.
- 2) Manufacturers:
 - a) Carbolite Company.
 - b) Sherwin-Williams Company (The).

- c) Tnemec Inc.
 - d) Approved Equivalent.
 - 3) Solids Content: 100 percent by volume.
 - c. Finish Coats:
 - 1) Amine-cured epoxy.
 - 2) Manufacturers:
 - a) Carboline Company.
 - b) Sherwin-Williams Company (The).
 - c) Tnemec Inc.
 - d) Approved Equivalent
 - 3) Minimum Solids Content: 80 percent by volume.
 - 4) Number of Coats: Two.
 - 5) Dry Film Thickness per Coat: 3-5 mils.
3. Application: Interior of sewer manholes, including metal appurtenances.
- a. Surface Preparation: As recommended by coating manufacturer.
 - b. Filler-Sealer:
 - 1) Amine-cured epoxy.
 - 2) Manufacturers:
 - a) Carboline Company.
 - b) Sherwin-Williams Company (The).
 - c) Tnemec Inc.
 - d) Approved Equivalent.
 - 3) Minimum Solids Content: 68 percent by volume.
 - 4) Number of Coats: One.
 - c. Finish Coats:
 - 1) Vinyl ester.
 - 2) Manufacturers:
 - a) Carboline Company.
 - b) Sherwin-Williams Company (The).
 - c) Tnemec Inc.
 - d) Approved Equivalent.
 - 3) Total Dry Film Thickness: 40 mils.

END OF SECTION 099635

SECTION 220500 - BASIC PLUMBING MATERIALS AND METHODS

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 the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Sleeves.
 - 4. Equipment installation requirements common to equipment sections.

1.3 DEFINITIONS

- A. The following are industry abbreviations for plastic materials:
 - 1. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Escutcheons.

1.5 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

2.3 JOINING MATERIALS

- A. Refer to individual Division 22 piping Sections for special joining materials not listed below.
- B. Solvent Cements for Joining Plastic Piping:
 - 1. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.4 TRANSITION FITTINGS

- A. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.
 - 1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Fernco, Inc.
 - c. Mission Rubber Company.
 - d. Plastic Oddities, Inc.

2.5 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

- a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Sections for flashing materials and installation.
 - 1) Seal space outside of sleeve fittings with grout.
4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- D. Verify final equipment locations for roughing-in.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations.
- D. Install equipment to allow right of way for piping installed at required slope.

END OF SECTION 220500

SECTION 221316 – SANITARY WASTE AND VENT PIPING

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 sanitary waste and vent piping inside the building and to locations indicated.
- B. Related Sections include the following:
 - 1. Division 22 Section "Plumbing Specialties" for soil, waste, and vent piping systems specialties.

1.3 DEFINITIONS

- A. The following are industry abbreviations for plastic piping materials:
 - 1. PVC: Polyvinyl chloride plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working-pressure ratings, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.

1.5 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 PVC PIPING

- A. Solid Wall PVC Pipe: ASTM D2665, Drain, Waste and Vent, Schedule 40.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns and to fit pipe.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Refer to Division 31 "Earthwork" Sections for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. Underground and Aboveground Soil, Waste, and Vent Piping:
 - 1. Solid wall, Schedule 40, PVC pipe: ASTM D2665 DWV, PVC socket fittings; and solvent-cemented joints.

3.3 PIPING INSTALLATION

- A. Refer to Division 33 "Utility" Sections for Project-site sanitary sewer piping.
- B. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping installation.
- C. Install cleanouts as indicated on the plans.
- D. Install cast-iron sleeve with at each service pipe penetration through foundation wall.
- E. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

- F. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- G. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 and smaller; 1 percent downward in direction of flow for piping NPS 4 and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- H. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- I. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- J. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for basic piping joint construction.
- B. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
- B. Support vertical piping and tubing at base and at each floor.
- C. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 - 2. NPS 3: 48 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 - 4. NPS 6: 48 inches with 3/4-inch rod.
- D. Install supports for vertical PVC piping every 48 inches.
- E. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
 - 1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
 - 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 - 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Specialties."
 - 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PROTECTION

- A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 221316

SECTION 224210 - PLUMBING SPECIALTIES

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 the following plumbing specialties:

- 1. Floor drains, roof drains, and cleanouts.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

- 1. Sanitary Waste and Vent Piping: 10-foot head of water.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections for the following:

- 1. Floor drains, roof drains, and cleanouts.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of plumbing specialties and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

- C. NSF Compliance:

- 1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for drain, waste, and vent piping components. Include marking "NSF-DWV" on plastic drain, waste, and vent piping.
- 2. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CLEANOUTS, FLOOR DRAINS, AND ROOF DRAINS

- A. Comply with ASME. See "DRAIN SCHEDULE" on plans.
 - 1. Products:
 - a. Josam Co.
 - b. Smith, Jay R. Mfg. Co.
 - c. Tyler Pipe, Wade Div.
 - d. Watts Industries, Inc., Drainage Products Div.
 - e. Zurn Industries, Inc., Specification Drainage Operation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Refer to Division 22 Section "Basic Plumbing Materials and Methods" for piping joining materials, joint construction, and basic installation requirements.
- B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
 - 1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
 - 2. Locate at each change in direction of piping greater than 45 degrees.
 - 3. Locate at minimum intervals of 100 feet for piping NPS 4 and for larger piping.
 - 4. Locate at base of each vertical soil and waste stack and storm conductor.
- C. Install flashing flange and clamping device with each stack and cleanout passing through floors with waterproof membrane.
- D. Install vent flashing sleeves on stacks passing through roof. Secure over stack flashing according to manufacturer's written instructions.
- E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.
 - 1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
 - a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install traps on plumbing specialty drain outlets.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect plumbing specialties to piping specified in other Division 22 Sections.

3.3 FLASHING INSTALLATION

- A. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 224210

SECTION 230512 - BASIC HVAC MATERIALS AND METHODS

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 the following:
 - 1. Sleeves.
 - 2. Escutcheons.
 - 3. Equipment installation requirements common to equipment sections.
 - 4. Painting and finishing.

1.3 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.4 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.2 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. One-Piece, Floor-Plate Type: Cast-iron floor plate.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- C. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

- b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Sections for flashing materials and installation.
 - 1) Seal space outside of sleeve fittings with grout.
- 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.3 PAINTING

- A. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION 230512

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONING UNITS

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 split-system air-conditioning units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of split-system units and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

1.5 COORDINATION

- A. Where concrete bases are shown on the plans: coordinate size and location of concrete bases for units. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete."
- B. Where split-system air conditioning units are shown on the plans located within pre-cast concrete buildings: coordinate size and location of pre-cast openings required for refrigerant piping, condensate piping, power wiring, control wiring, etc., routed between interior and exterior units.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years for compressor from date of Substantial Completion, one year on remaining components.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set of filters for each unit.
 - 2. Fan Belts: One set of belts for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carrier Air Conditioning; Div. of Carrier Corporation.
 - 2. Mitsubishi Electronics America, Inc.; HVAC Division.
 - 3. Sanyo Fisher (U.S.A.) Corp.
 - 4. Trane Company (The); Unitary Products Group.
 - 5. York International Corp.

2.2 EVAPORATOR-FAN COMPONENTS

- A. General: Evaporator-fan unit shall be completely factory assembled including coil, condensate drain pan, fan, motor, filters, and controls in a casing.
- B. Cabinet, High-wall type: Polystyrene, with a baked enamel or polyester powder coating, with removable panels on front and ends, with drain connection.

- C. Cabinet, Ceiling mounted cassette type: steel cabinet, with enamel coated steel combination supply-air and return-air discharge grille.
- D. Insulation: Cabinet to be completed insulated with cleanable, foil-faced, fire-retardent, fiberglass insulation.
- E. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve. See plans and equipment schedules for refrigerant circuit quantities (single, dual, etc.).
- F. Fan: Forward curve, centrifugal fan. Direct drive for nominal 4 tons and below. Belt drive, adjustable for nominal 5 tons and above.
- G. Fan Motors: Multitapped, multispeed for nominal 4 tons and below. Single speed for nominal 5 tons and above. All to have internal thermal protection and permanent lubrication.
- H. Filters: Permanent, cleanable, or 2-inch thick pleated throwaway type as indicated on the plans and equipment schedules.

2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

- A. Casing: Galvanized steel, finished with baked enamel or polyester powder, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
- B. Compressor(s): Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 1. Compressor Type: Reciprocating or Scroll.
 - 2. Manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 3. Compressor Quantities: See plans and equipment schedules for compressor quantities, as related to single or dual circuits.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.
- F. Low Ambient Operation: Permits heating operation down to -4 deg F. Permits cooling operation down to 0 deg F.
- G. Mounting: Manufacturer's mounting bracket systems for wall mounted applications; equipment supports for rooftop applications, and concrete base for grade applications.

2.4 ACCESSORIES

- A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

1. Compressor time delay.
 2. 24-hour time control of system stop and start.
 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 4. Fan-speed selection, including auto setting.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- D. See equipment schedules on the plans for additional accessories unique for each piece of equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install wall-mounted, compressor-condenser components using manufacturer's wall-mounting assemblies.
- D. Install roof-mounted, compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.
- E. Install ground-mounting, compressor-condenser components on 6-inch-thick, reinforced concrete base; 4 inches larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.
- F. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to unit to allow service and maintenance.
- C. Install pvc condensate piping systems as indicated on the plans.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding."

- E. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.
- F. Provide control wiring, conduits in accordance with Division 26 Sections.

3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 STARTUP SERVICE AND DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain units. Refer to Division 1 for Closeout Procedures.
- B. Operational Demonstration shall be per Division 1 Sections.
- C. Instruction of the Owner's Personnel shall be per Division 1 Sections.

END OF SECTION 238126

SECTION 238339 - ELECTRIC HEATERS

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 electric unit heaters and wall heaters.

1.3 SUBMITTALS

- A. Product Data: Include specialties and accessories for each unit type and configuration.
- B. Maintenance Data: For heaters to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Maintenance schedules and repair parts lists for motors, coils, integral controls, and filters.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.5 COORDINATION

- A. Coordinate layout and installation of heaters and suspension system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Berko, Division of Marley Products.
 - 2. Markel Products Co.
 - 3. Chromalox, Inc.
 - 4. Electromode.

5. Indeeco.

2.2 ELECTRIC HEATERS

- A. Description: An assembly including casing, heating element, fan, and motor in blow-through configuration.
- B. 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.
- C. Comply with UL 2021.
- D. Comply with UL 823.

2.3 MATERIALS

- A. Cabinet, Unit Heaters: 18 gauge welded steel cabinet with powder coated finish, and control compartment housing a terminal board with a hinged and latched access door.
- A. Cabinet, Wall Heaters: 18 gauge steel housing with powder coated 18 gauge steel grille, with extruded aluminum front frame.

2.4 ELECTRIC-RESISTANCE HEATING ELEMENTS

- A. Unit Heaters: copper clad steel sheath element with continuously brazed steel fins formed to allow side draw through airflow. Overheat protection shall be automatic reset type limit controls to de-energize the heater should over-temperature occur.
- B. Wall Heaters: steel block fin element. Heating element shall be of the sealed tubular type with parallel steel fins for quick heat transfer. Unit shall have a thermal overload cut-off, and automatic reset thermal limit.

2.5 FAN AND MOTORS

- A. Unit Heaters: Propeller type fan with aluminum wheel directly mounted on motor shaft in the fan venturi. Individual adjustable horizontal louvers for directional control. Motor is totally enclosed, 1-speed, permanently lubricated, thermally protected.
- B. Wall Heaters: vane axial type. Motor is low speed, 4-pole, permanently lubricated, thermally protected.

2.6 ACCESSORIES AND CONTROLS

- A. See "Equipment Schedules" on the Plans.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for electrical connections to verify actual locations before heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install heaters level and plumb.
- B. Install heaters to comply with NFPA 90A.
- C. Suspend heaters from structure with manufacturer's mounting brackets.
- D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.3 CONNECTIONS

- A. See Division 26 Sections for grounding of equipment and power wiring.
- B. Provide temperature control wiring in conduits in accordance with Division 26 Sections.
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing and report results in writing:
 - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safeties.
- B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.5 CLEANING

- A. After installing units, inspect unit cabinet for damage to finish. Remove paint splatters and clean other spots, dirt, and debris. Repair damaged finish to match original finish.

3.6 ADJUSTING

- A. Adjust initial temperature set points.

3.7 DEMONSTRATION

Train Owner's maintenance personnel to adjust, operate, and maintain cabinet unit heaters. Refer to Division 1 Section Closeout Procedures."

END OF SECTION 238339

SECTION 260500 - GENERAL REQUIREMENTS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. General
- B. Intent Of Drawings
- C. Interpretation Of Drawings
- D. Quality Control
- E. Submittals
- F. Location Environmental Considerations
- G. Products
- H. Coordination
- I. Demolition
- J. Electrical Installation
- K. Relocate or Make Modifications to Any Existing Electrical, Instrumentation or Control Systems Wiring
- L. Quality Assurance
- M. Examination
- N. Preparation And Storage
- O. Installation
- P. Field Quality Control
- Q. Painting
- R. Cleaning
- S. Operation - Maintenance And Spare Parts Data

1.2 GENERAL

- A. The Electrical Contractor shall be responsible to check with the equipment manufacturers of the physical size of the equipment that it will fit and that it can be moved into the indicated locations.
- B. Intent of Drawings – The Drawings are not intended to be used for construction purposes for the electrical work, but to supplement the Specifications as to the principal features of the electrical design. The intent of this section is that all equipment and electrical devices furnished and installed under this and other sections of the Specifications be properly interconnected to permit successful system operation regardless of whether all interconnections are specifically referenced in the Specifications and associated Drawings.
- C. Interpretation of Drawings
 - 1. The locations of equipment to which electrical connections are to be made are approximate as shown on the Drawings. It shall be the Electrical Contractor's responsibility to determine the exact conduit locations by reviewing shop drawings. The sizes of disconnect switches, motor starters, overload heaters, fuses or circuit breakers are approximate, and it shall be the Electrical

Contractors responsibility to obtain the correct sizes based on the actual installed equipment or items. The conduit and wire sizes shown on the Drawings are the minimum sizes required and shall not be reduced.

D. Quality Control

1. The Electrical Contractor shall maintain a level of quality of materials and installation means as to assure the completed electrical, instrumentation and control system will be completed in compliance with the Specifications.

E. Submittals

1. Shop Drawings - Submit shop drawings under provision of Section 013323 for all electrical equipment and devices.
2. Shop drawings shall include manufacturer's literature, specifications, schematic diagrams, field wiring interconnection diagrams and any other data necessary to indicate compliance with the Specifications
3. Final "Record" Contract Drawings - Drawings and information required shall include but not be limited to the following:
 - a. Conduit runs shall be shown and identified at each end of run, include where conduit originates and the termination. Each conduit shall have a pull string attached and fastened at each end.
 - b. Power Distribution Schematics - Show actual installed switching details, cable size and type, conduit size, locations and runs, fuse size and type, circuit breaker frame size, trip setting and type.
 - c. Details and Diagrams
 - 1) Elementary Wiring Diagrams – Show actual motor control wiring with wire numbers, telephone system cable routing and station identification with cable numbers.
 - 2) One Line Diagrams - Show equipment names, fuse sizes and types, heater sizes, conduit and wire sizes, motor FLA and horsepower. Include wire and cable numbers or identification.
 - 3) Instrumentation and Control Diagrams - Show actual installed, wired instrumentation loop diagrams, include actual installed device Tag No.'s, Model No.'s, and Scaling.
 - d. Lighting and Device Schedule
 - 1) Show actual manufacturers and model numbers.
 - 2) Lighting panel layouts
 - 3) Actual circuit No. circuit description, breaker size and type.
4. Payment for the Division 26 work and materials shall not exceed 90% of the total bid price until all Operations and Maintenance data and record as-built drawings have been completed and received by the Owner.

G. Location Environmental Considerations

1. Provide satisfactory operation and maintenance under the following conditions

2. Temperature:
 - a. Outside: -20° to 110°F
 - b. Inside: +40° to 120°F
3. Relative Humidity: 100 percent
4. Process Temperature:
 - a. Liquid: 32° to 105°F
 - b. Air: -32° to 200°F
5. Atmosphere:
 - a. As indicated on the drawings
 - b. Corrosive atmosphere, Hydrogen Sulfide
 - c. Wet Locations
 - 1) As defined in NEC ART 100
 - 2) Outside exposed areas, areas indoors near pumps, frequent washdown areas.
 - d. The interiors of conduits and raceways located in wet areas shall also be designated as wet areas.
 - e. Damp Locations
 - 1) As defined in NEC ART 100
 - 2) Areas under covered enclosures
 - f. Wet and Corrosive areas
 - 1) Enclosures located in areas that are wet and corrosive shall be rated for NEMA 4X Stainless Steel or as noted on the drawings.
 - g. Hazardous Areas (Classified)
 - 1) Areas that are classified as hazardous are indicated on the drawings. All new equipment and installation methods shall conform to the requirements in the NEC.

H. Products

1. Electrical materials and equipment shall be new and shall be labeled by the Underwriters Laboratories, Inc. whenever standards have been established and the label service applies.
2. Wire and Terminal Labeling - Tag all wires, cables, and conduits at each end or termination with suitable permanent tags, printed, stamped, or engraved with the wire, cable, or conduit number. The figures on the tags shall be clear and legible.
3. Safety Signs - High voltage warning signs shall be provided and placed at all guarded locations as required by the NEC. The signs shall be permanent and conspicuous and shall be plainly visible even when doors are open or panels removed from compartments.
4. Engraved Nameplates - Identify all electrical enclosures with engraved phenolic nameplates. Engrave and mount nameplates for all switchgear, disconnect switches, and individual motor starter enclosures indicating equipment served. Nameplates shall be **white with black letters**. Minimum letter size shall be one-quarter inch.

I. Demolition

1. Electrical Contractor shall disconnect power from existing equipment to be removed. General Contractor to remove and dispose of actual equipment.
2. Electrical contractor shall perform the demolition of electrical equipment where indicated on the electrical contract drawings.

J. Electrical Installation

1. Electrical Contractor shall furnish and install, adjust, connect, and put into satisfactory operation all electrical equipment, control components, and instrumentation items as indicated on the Drawings and specified herein.

K. Coordination

1. Electrical Contractor shall review all Specifications and Drawings for the electrical work included under these sections and coordinate this work, investigate existing conditions in the field before submitting proposal, become acquainted with the conditions under which the work of this section of the Specifications will be performed, and accept all conditions as found.
2. Schedule and coordinate all relocations of, or modifications to, electrical instrumentation or control systems wiring, conduit equipment, or appurtenances to whatever extent is necessary and required in order to conform to structural and architectural conditions, duct work and piping interferences, etc. This shall be included under this section of the Specifications.
3. Coordinate with other trades on the project so that all trades install their work to avoid interference with each other. Arrangements made among the trades which result in deviations from Drawings and Specifications are subject to the approval of the Owner.
4. The control panels and/or equipment are to be provided by the equipment supplier, General Contractor, or Systems Integrator. These items will require power and/or interconnections from the disconnect switch to the control panel and/or field mounted devices or junction boxes for power and control. Specific details to be determined by the shop drawings.

1.3 REFERENCES

- A. American National Standards Institute (ANSI)
- B. Factory Mutual Engineering Division (FM)
- C. Illumination Engineering Society (IES)
- D. Institute of Electrical & Electronics Engineers (IEEE)
- E. Insulated Cable Engineers Association (ICEA)
- F. Instrumentation, Systems and Automation Society (ISA)
- G. Joint Industrial Council (JIC)
- H. National Electrical Code (NEC)

- I. National Electrical Manufacturers Association (NEMA)
- J. International Electrical Testing Association (NETA)
- K. National Fire Protection Association (NFPA)
- L. Occupational Safety and Health Administration (OSHA)
- M. Ohio Building Code (OBC)
- N. Underwriters' Laboratories, Incorporated (UL)
- O. ANSI/NEMA 1-2000 Standard Practices for Good Workmanship in Electrical Contracting
- P. Quality Assurance
 - 1. Regulatory requirements
 - a. The Contractor shall obtain and pay for all fees for permits and inspections as required.
 - 2. Installation Standards
 - a. NEC – installation of electrical items shall be in accordance with the NEC.
 - b. Instrumentation and control – Installation of the instrumentation, control system shall be in accordance with standards of the ISA.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inspect all devices at delivery for damage.
- B. Confirm all devices at delivery are as required according to design and shop drawings.
- C. Examine the site and structures for any obstructions which may interfere with the electrical installation as planned.

3.2 PREPARATION AND STORAGE

- A. Provide a dry, heated storage area for all electrical and electronic equipment and devices.
- B. Electrical and electronic equipment devices shall be stored and heated to prevent condensation from forming. Electrical and electronic equipment found with condensation in the enclosure or condensation-caused damage will not be accepted.

3.3 INSTALLATION

- A. The locations of equipment to which electrical connections are to be made are approximate as indicated on the Drawings.
- B. It shall be the Contractor's responsibility to check shop drawings relating to equipment requiring electrical connections and to determine the exact conduit locations.

- C. Electrical and electronic equipment installed but not energized shall continue to have a heat source to keep the enclosure free of condensation. Electrical and electronic equipment found with condensation in the enclosure or condensation-caused damage will not be accepted.
- D. Contractor shall perform all chasing, channeling, drilling, and patching necessary to complete the work. Repair any damage to the building or any equipment. Replace damaged equipment if, in the Engineer's judgment, the repair would not be satisfactory.
- E. No work shall be covered or hidden from view until it has been inspected and approved by the Owner.
- F. Any workmanship or materials not meeting the requirements of the Specifications or Drawings shall be immediately replaced by the Contractor without cost to the Owner and to the satisfaction of the Owner.
- G. All wiring shall have permanent labels at all terminations and junctions and on all field wiring terminal strips.
- H. Safety signs shall be furnished and installed on or around all electrical equipment.
- I. Permanent marking labels shall be installed on exposed sides of each piece of electrical equipment, pull boxes, junction boxes, and terminal boxes stating the maximum voltage level involved with the associated equipment.
- J. Concrete equipment pads for electrical equipment shall be furnished and placed by the Electrical Contractor.

3.4 PAINTING

- A. All wood panel mounting boards shall be painted.
- B. All electrical enclosures shall undergo a phosphatizing prepainting treatment. Final paint coats shall be a polyester powder coating with ANSI 61 light gray color for enclosures mounted inside and with ANSI 24 medium gray color for enclosures mounted outside.
- C. Remove any rust and touch up any scratches on all new electrical devices or enclosures with matching touch-up paint as supplied by the manufacturer.

3.5 FIELD QUALITY CONTROL

- A. Major components of the Electrical System shall be tested per NETA standards. NETA's Standard Specification for Testing, Parts 1 to 5, shall govern all testing.

- B. The following tests are per NETA Acceptance Testing Specifications, Part 7, Inspection and Test Procedures. Visual and Mechanical Inspections shall be performed for all equipment.
1. Cables - Low Voltage shall have the following tests: Insulation resistance, continuity.
 2. Circuit Breakers - Low Voltage (Molded Case) that are rated at or over 100 amps shall have the following tests: Contact resistance, time-current characteristic, instantaneous pickup current, insulation resistance.
 3. Grounding Systems shall have the following test: Fall of potential.
 4. Surge Arresters shall have the following tests: 60 Hz sparkover, insulation power factor, ground continuity.
- C. After all testing has been completed to the satisfaction of the Owner, the entire Electrical (Power) System shall operate for a minimum test period of 30 days. Cumulative down time of all components furnished under Division 26 shall not exceed 1/2 hour as recorded by the Engineer during the test period. System documentation shall be delivered on the last day of the test period. Test period shall not end until system documentation has been delivered. If the cumulative downtime limit is exceeded, the Engineer shall have the following options:
1. Extend the test period as required until the cumulative downtime during the proceeding 30 days does not exceed 1/2 hour as recorded by the Engineer.
 2. Sub-systems which have no components contributing to the cumulative downtime will be approved as a partial acceptance.
- D. Sub-systems which have components that contributed to the cumulative downtime shall have their test period begin again after all repairs and adjustments have been made.

3.6 OPERATION - MAINTENANCE AND SPARE PARTS DATA

- A. Submit specific data and information required under individual Division 26 Sections.
1. Submit operation data as required.
 2. Submit maintenance data as required.
 3. Spare Parts Data - Submit as required. Include manufacturer's list of recommended spare parts.
 4. Parts and supplies judged to be necessary to keep equipment and control system operating successfully for first year of operation shall be furnished.
 5. Review individual sections for required lists of spare parts to be furnished.

3.7 CLEANING

- A. All areas are to be cleaned of construction debris and wire. Electrical equipment is to be cleaned of all construction dirt, dust, etc.
- B. All electrical and electronic equipment shall be kept clean and free of all dust, dirt, and debris at all times.

- C. All electrical and electronic boxes and enclosures shall have the covers of these boxes and enclosures closed and sealed except when actually working in these boxes and enclosures.

END OF SECTION 260500

SECTION 260519 – CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Building wire and cable
- B. Wiring connectors and connections

1.2 RELATED SECTIONS

- A. Section 260553 - Electrical Identification

1.3 REFERENCES

- A. Quality Control: Follow requirements for references and standards.
- B. NECA Standard of Installation (National Electrical Contractors Association)
- C. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association)
- D. NFPA 70 - National Electrical Code

1.4 SUBMITTALS FOR REVIEW

- A. Submittals: Follow procedures for submittals.
- B. Product Data: Provide for each cable assembly type.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Contract Closeout Submittals – Follow as required.
- B. Project Record Documents: Record actual locations of components and circuits.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories Inc., or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated.
- B. Conductor sizes are based on copper only.
- C. Wire and cable routing indicated is approximate unless dimensioned.

1.9 COORDINATION

- A. Coordinate Work under provisions of Section 260500.
- B. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. Manufacturers:
 - 1. Okonite Company
 - 2. Alpha Wire Company
 - 3. Southwire
 - 4. Substitutions: Follow as required for Material and Equipment.
- B. Description: Multi-stranded insulated copper wire, #12 AWG minimum for feeders and branch circuits, and #14 AWG minimum for control circuits.
- C. Insulation Voltage Rating: 600 volts
- D. Insulation: NFPA 70; Type XHHW or THWN insulation for service, feeders and branch circuits and control circuits.

2.2 WIRING CONNECTORS

- A. Use split bolt connectors for copper conductor splices and taps #6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
- B. Use solderless pressure connectors with insulating covers for copper conductor splices and taps #8 AWG and smaller. Buchanan crimp (Split cap and insulator) or Ideal crimp connector with wrap cap insulator.
- C. Use Adhesive-lined heat shrink tubing for watertight connections, T&B, 3M, or Raychem.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Quality Control: Follow as required by manufacturer's instructions.
- B. Route wire and cable as required to meet Project Conditions.
- C. Install cable in accordance with the NECA "Standard of Installation."
- D. Use stranded conductors for control circuits.
- E. Use conductor not smaller than #12 AWG for power and lighting circuits.
- F. Use conductor not smaller than #14 AWG for control circuits.
- G. Use #10 AWG conductors for 20-ampere 120-volt branch circuits longer than 75 feet (25 m).
- H. Pull all conductors into raceway at same time.
- I. Use suitable wire pulling lubricant for building wire #4 AWG and larger.
- J. Protect exposed cable from damage.
- K. Use suitable cable fittings and connectors.
- L. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- M. Clean conductor surfaces before installing lugs and connectors.
- N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- O. Use split bolt connectors for copper conductor splices and taps #6 AWG and larger. Tape un-insulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- P. Use solderless pressure connectors with insulating covers for copper conductor splices and taps #8 AWG and smaller.
- Q. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps #10 AWG and smaller.
- R. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.
- S. Replace conductors damaged during installation.
- T. No splices are allowed in conduits or raceways.

3.4 FIELD QUALITY CONTROL

- A. Starting of Systems: Follow requirements for field inspection, testing, and adjusting.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION 260519

SECTION 260520 – SHIELDED INSTRUMENTATION & VARIABLE FREQUENCY DRIVE CABLE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: Furnish all labor, materials, equipment and incidentals required to provide shielded cable as shown and specified.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Comply with Section 013323.
- B. Product data:
 - 1. Submit for review copies of manufacturer's engineering data and technical information for shielded instrumentation cables proposed for use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Instrumentation Cable
 - 1. Single Shielded Pair or Triad: 300 volt
 - a. Tinned copper, #18 AWG or larger, stranded, polyethylene insulated conductors twisted with aluminum-polyester shield, stranded tinned #20 AWG copper drain wire and overall chrome vinyl jacket, 100 percent shield cover, rated for 300 volts minimum
 - b. Products and Manufacturers:
 - 1) Belden No. 8760, No. 8770, No. 9318, or No. 9365
 - 2) Alpha No. 2422, No. 2432
 - 2. Multi-paired Shielded 300 volt:
 - a. Tinned copper, #18 AWG, stranded PVC insulated conductors, twisted in pairs with aluminum-polyester shield over each pair and its stranded drain wire (#20 AWG), overall chrome vinyl jacket, 100 percent shield cover
 - b. Products and Manufacturers:
 - 1) 3 pair - Belden No. 9369
 - 2) 6 pair - Belden No. 9389
 - 3) 9 pair - Belden No. 9390
 - 4) 11 pair - Belden No. 9391
 - 5) 15 pair - Belden No. 9392
 - 6) Dekoron Poly-set
 - 7) Okonite type SP-OS

- B. Variable Frequency Drive Shielded Cable
 - 1. Four-conductor shielded cable
 - a. Shielding to have an overall shield with an 85% tinned copper braided shield.
 - b. Cable to be Belden Variable Frequency Drive Cable models 29502 through 29535, wire size as indicated or equal.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Delivery, Storage and Protection: Comply with Section 016600.

3.2 INSTALLATION

- A. Install in conduit separated from power cables unless otherwise shown on the Drawings.
- B. Install instrumentation cable conduits as far as possible from power cable conduit.
- C. Ground shield at one end only, as recommended by instrument manufacturer, and as approved by the Owner.
- D. Terminate stranded conductors with pre-insulated crimp type ring tongue terminals properly sized to fit fastening device and to fit wire size.
- E. Identification: Identify all conductors at each terminal and splice location. Identification number labels shall be Thomas & Betts type WSL cable markers or equal with clear heat shrink tubing over the marker.
- F. Install Cat 5e and Cat 6 cabling in accordance with Commercial Building Telecommunications Pathways and Spaces ANSI/TIA/EIA 569-A and Commercial Building Telecommunications Cabling Standard ANSI/TIA/EIA 568-A.

3.3 TESTING

- A. Test each circuit in the presence of the Owner after permanent cables are in place to demonstrate that the circuit and connected equipment perform satisfactorily and that they are free from improper grounds and short circuits.
- B. Maintain a written record of circuits being tested, marking down circuit number and descriptive function and results of each step in the test procedures including repeated tests.
- C. Any cable or a portion of the cable which fails when tested shall be replaced with a new cable for the full length and retested.

END OF SECTION 260520

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Grounding electrodes and conductors
- B. Equipment grounding conductors
- C. Bonding

1.2 RELATED SECTIONS

- A. Section 033000 - Cast-In-Place Concrete

1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code

1.4 GROUNDING SYSTEM DESCRIPTION

- A. The system shall consist of a series of driven ground rod electrodes interconnected with bare stranded ground conductors.
- B. All building footer and slab rebar greater than ½" diameter shall be bonded to the ground conductor. Bond at 20-ft intervals and at each corner. IAW NEC connections to rebar may be made with suitable sized ground clamps.
- C. All connections shall be exothermic welds (Cadweld or equal) installed according to the manufacturer's instructions.
- D. Tests shall be performed to determine the grounding grid resistance to ground. The test method shall be as described in NETA Standard ATS-1987, "Acceptance Testing Specification For Electrical Power Distribution Equipment and Systems." A three-point fall-of-potential test shall be used using two auxiliary electrodes for the measurement. Test reports shall be provided describing the testing procedure and results. The grid-to-ground resistance shall be no greater than 5 ohms. If necessary, additional rods shall be added to achieve the 5-ohm ground. When the Contractor has obtained satisfactory results, he shall submit test reports to the Engineer for approval. After approval, the contractor shall bond the service entrance ground grid to the service entrance enclosure ground bus. The Owner or Owner's representative shall have the opportunity to inspect all exothermic welds.
- E. All ground cables shall have a minimum of 24" of ground cover.

1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum.

1.6 SUBMITTALS

- A. Product Data: Provide for grounding electrodes and connections.
- B. Test Reports: Indicate overall resistance to ground (and resistance of each electrode).
- C. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation and installation of exothermic connectors.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 260500.
- B. Accurately record actual locations of grounding electrodes.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 ROD ELECTRODE

- A. Manufacturers:
 - 1. ITT Blackburn Co.
 - 2. Copperweld, Bimetallic
 - 3. American Electric - Blackburn
- B. Material: Copper-clad steel
- C. Diameter: 3/4 inch
- D. Length: 10 feet

2.2 MECHANICAL CONNECTORS

- A. Manufacturers:
 - 1. Burndy Corp
 - 2. O-Z/Gedney

- B. Material: Bronze

2.3 EXOTHERMIC CONNECTIONS

- A. Manufacturers:
 - 1. Cadweld

2.4 WIRE

- A. Material: Stranded copper
- B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.2 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground spaced at minimum 10 ft.
- C. Provide bonding to meet Regulatory Requirements.
- D. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

END OF SECTION 260526

SECTION 260529 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment supports
- B. Anchors and fasteners
- C. Concrete equipment supports

1.2 REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code

1.3 SUBMITTALS

- A. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

- C. Anchors and Fasteners:
 - 1. Concrete block walls: Use expansion anchors.
 - 2. Steel Structural Elements: Use welded fasteners.
 - 3. Concrete Surfaces: Use expansion anchors.

2.2 CHANNEL SYSTEMS

- A. Manufacturers:
 - 1. Unistrut
 - 2. B-Line
 - 3. Allied Power - Strut
 - 4. or Approved Equal
- B. Description:
 - 1. Galvanized steel - General locations
 - 2. Aluminum - Wet, damp areas
 - 3. Stainless steel - Wet, damp, corrosive areas where compatible with chemicals
 - 4. Fiberglass - Wet, damp, corrosive areas where compatible with chemicals
- C. Size: 1-5/8" x 1-5/8"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes and conduit except as shown on Drawings.
- D. Obtain permission from Engineer before drilling or cutting structural members.
- E. Fabricate supports from structural steel, galvanized steel, aluminum, or stainless steel channel. Rigidly weld members or use stainless steel hex head bolts and hardware to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- F. Install surface-mounted cabinets and panel boards with minimum of four anchors.
- G. In wet and damp locations use stainless steel or aluminum channel supports with stainless steel fasteners.
- H. In wet and damp locations use stainless steel or aluminum spacers to stand cabinets and panel boards one inch off wall.

- I. Spray coat cut end of galvanized steel channel or rigid steel conduit with spray cold galvanizing.
- J. Galvanized pipe used as equipment supports are to have the open ends capped with galvanized end caps.
- K. Provide concrete equipment pad, housekeeping pads, for all equipment that will be floor mounted. Pads to be formed, chamfered edges, and have a troweled finish. Concrete shall be smoothed around conduits. Equipment panels shall be anchored using concrete anchors. Equipment pads for outdoor mounted panels shall extend from the front of the equipment panel 3'-6" min. to allow for opening and standing.

END OF SECTION 260529

SECTION 260530 – ELECTRICAL DUCT BANK

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. PVC conduit
- B. Pull Boxes/Handhole Enclosures

1.2 MEASUREMENT AND PAYMENT

- A. Duct bank:
 - 1. Basis of Payment: Includes purchase, delivery, and installation of duct, fittings, supports, accessories, trenching, aggregate bedding or concrete encasement (where required), and backfill.
- B. Pull Boxes/Handhole Enclosures
 - 1. Basis of Payment: Includes purchase, delivery, and installation of pull box.

1.3 REFERENCES

- A. Quality Control: Follow requirements for references and standards.
- B. ASTM C857 - Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
- C. ASTM C858 - Underground Precast Concrete Utility Structures
- D. STM C891 - Installation of Underground Precast Utility Structures
- E. ASTM C1037 - Inspection of Underground Precast Utility Structures
- F. IEEE C2 - National Electrical Safety Code
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- H. NEMA TC 2 and TC3 - Schedule 40 PVC Conduit and PVC Fittings for Use with Rigid PVC Conduit and Tubing
- I. NFPA 70 - National Electrical Code
- J. UL 651A - Type EB and A PVC Conduit and HDPE Conduit
- K. ANSI/SCTE 77-2007 Specifications for Underground Enclosure Integrity

1.4 SUBMITTALS FOR REVIEW

- A. Submittals: Follow procedures for submittals.
- B. Product Data: Provide for manhole accessories.
- C. Shop Drawings: Indicate dimensions, reinforcement, size and locations of openings, and accessory locations for precast manholes.

1.5 SUBMITTALS FOR INFORMATION

- A. Follow requirements for submittals in general project requirements.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 SUBMITTALS FOR CLOSEOUT

- A. Project Record Documents: Record actual routing and elevations of underground conduit and duct, and locations and sizes of manholes.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.8 FIELD SAMPLES

- A. Provide as required.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.
- C. Duct bank routing is shown in approximate locations unless dimensions are indicated. Route as required to complete duct system.
- D. Pull box locations and quantity are shown in approximate locations. Locate as required to complete duct bank system.

PART 2 - PRODUCTS

2.1 PLASTIC CONDUIT

- A. Rigid Plastic Conduit: NEMA TC 2, Schedule 40 PVC, with fittings and conduit bodies to NEMA TC 3
- B. Rigid Plastic Underground Conduit: UL 651A, Type A PVC

2.2 DUCT BANK PULL BOXES

- A. Description: Pull boxes shall be as manufactured by Quazite.
 - 1. Load capacity of box to be as indicated on drawings or as indicated in ANSI SCTE-77-2007.
- B. Provide all necessary items for a complete installation.
- C. Pull boxes shown are approximate sizes. Size pull boxes as required for proper installation.
- D. Enclosure With Walls 48" or Shorter
 - 1. Enclosures, boxes and cover are required to conform to all test provisions of ANSI/SCTE 77 "Specifications For Underground Enclosure Integrity" for Tier as shown on Drawings. When multiple Tiers are specified, the boxes must physically accommodate and structurally support compatible covers while possessing the highest Tier rating. In no assembly can the cover design load exceed the design load of the box. All components in an assembly (box & cover) are manufactured using matched surface tooling. All covers are required to have a minimum coefficient of friction of 0.05 in accordance with ASTM C1028 and the corresponding Tier level embossed on the top surface. Independent third-party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal.

2.3 ACCESSORIES

- A. Underground Warning Tape: 4-inch-wide plastic tape, metal-backed, colored red or yellow with suitable warning legend describing buried electrical lines
- B. Underground conduit PVC support chairs

PART 3 - EXECUTION

3.1 DUCT BANK INSTALLATION

- A. Quality Control: Follow requirements in manufacturer's instructions.

- B. Install duct to locate top of duct bank at depths as indicated on drawings.
- C. Install duct with minimum slope of 4 inches per 100 feet. Slope duct away from building entrances.
- D. Cut duct square using saw or pipe cutter; de-burr cut ends.
- E. Insert duct to shoulder of fittings; fasten securely.
- F. Join nonmetallic duct using adhesive as recommended by manufacturer.
- G. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- H. Install no more than equivalent of three 90-degree bends between pull points.
- I. Use suitable separators and chairs installed not greater than 4 feet on centers.
- J. Conduit spacing shall be 12" minimum from 480/277-volt conduits to mA/communication signal conduits and 6" minimum from 120/240-volt conduits and mA/communication signal conduits.
- K. Provide suitable pull string in each empty duct.
- L. Swab duct with wire brush and mandrel. Use suitable caps to protect installed duct against entrance of dirt and moisture.
- M. Backfill as required in Backfill Section. Aggregate bedding shall be placed and tamped in layers. Bedding shall be placed in trench bottom prior to installation of the bottom ducts.
- N. Concrete encasement required where indicated. Ensure that concrete totally encases conduits in duct bank to eliminate any voids.
- O. Interface installation of underground warning tape with backfilling as required in Backfill Section. Install tape 6 inches below finished surface.
- P. Install a vertical two-foot length of #8 rebar to extend to 6" below finish grade at each duct bank intersection, bend, and at 100-ft intervals of straight duct bank run for locating the duct bank.

3.2 PULL BOXES/HANDHOLE ENCLOSURES

- A. Quality Control: Follow requirements in manufacturer's instructions.
- B. Excavate for manhole installation under the provisions of Excavation Section.

- C. Excavate hole approximately 8" deeper than the depth of the pull box at finished grade and approximately 8" larger than the box. Provide minimum of six to eight inches of gravel in the excavation bottom. Compact gravel to minimize settling.
- D. Set box on compacted gravel and backfill to finished grade.
- E. Install in accordance with NEC 314.30.

END OF SECTION 260530

SECTION 260533 - CONDUIT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit
 - 1. Rigid Galvanized Steel
 - 2. Aluminum
- B. PVC coated rigid galvanized steel
- C. Nonmetallic conduit
- D. Flexible metal conduit
- E. Liquid-tight flexible metal conduit
- F. Fittings and conduit bodies

1.2 RELATED SECTIONS

- A. Section 260529 - Supporting Devices
- B. Section 260553 - Electrical Identification
- C. Sections 260534 - Boxes

1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated
- B. ANSI C80.5 - Rigid Aluminum Conduit
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
- D. ANSI/NFPA 70 - National Electrical Code
- E. NECA "Standard of Installation"
- F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
- G. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing

1.4 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70

1.5 SUBMITTALS

- A. Submit under provisions of Section 012333.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquid-tight flexible metal conduit, nonmetallic conduit, flexible nonmetallic conduit, fittings, conduit bodies of each type planned to be used.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of project general requirements.
- B. Accurately record actual routing of all conduits exposed and concealed on record drawings.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc as suitable for purpose specified and shown.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site under provisions of Section 016600.
- B. Accept conduit on site. Inspect for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.9 PROJECT CONDITIONS

- A. Verify routing and termination locations of conduit prior to rough-in.
- B. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch, unless otherwise specified
- B. Underground Installations:
 - 1. More than two feet from Foundation Wall: Use schedule 40 PVC conduit.
 - 2. Within two feet from Foundation Wall: Use plastic coated galv. rigid conduit.
 - 3. In or Under Slab on Grade: Use schedule 40 PVC conduit.
 - 4. When changing from underground to above ground, use PVC-coated galvanized rigid conduit to approximately two feet above finished grade.
 - 5. Conduits passing through poured concrete sidewalks, floating type slabs on grade shall be sleeved.
- C. Outdoor Locations, Above Grade: Use rigid galvanized steel conduit.
- D. In Slab Above Grade:
 - 1. Use schedule 40 PVC.
 - 2. Maximum Size Conduit in Slab: 3/4" for conduits crossing each other.
- E. Continuously Wet and Damp Locations: Use aluminum or PVC-coated rigid steel conduit.
- F. Corrosive Location: Use PVC-coated rigid steel or schedule 40 PVC.
- G. Dry Locations:
 - 1. Concealed in framed wall or above suspended ceilings: Use steel electrical metallic tubing or schedule 40 PVC conduit.
 - 2. Exposed: Use rigid galvanized steel or aluminum conduit or as noted on drawings.
 - 3. Flexible metal conduit can be used for equipment connections. Max length of 3 feet.
- H. Classified hazardous Class I, Division 1 areas & Screen Rooms: PVC coated rigid steel conduit and explosion-proof flexible equipment connections.
- I. Equipment Connections:
 - 1. Use liquid-tight flexible metal conduit.
 - 2. In corrosive or chemical rooms use non-metallic flexible conduit and fittings.
- J. Flexible Conduits shall be limited to three feet or less.

2.2 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1 all steel fittings

2.3 PVC COATED METAL CONDUIT

- A. Manufacturers:
 - 1. Robroy Industries "Plasti-Bond"
 - 2. Thomas & Betts "OCAL Blue"
- B. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.4 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked aluminum construction
- B. Fittings: ANSI/NEMA FB 1

2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 - 1. Sealtight VA Anaconda Metal Hose Div.
 - 2. Liquidtight type L.A. Electric Flex Co.
- B. Description: Interlocked aluminum construction with PVC jacket
- C. Fittings: ANSI/NEMA FB 1

2.6 NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. Carlon Electrical Products Div.
 - 2. LCP
 - 3. Quil
- B. Description: NEMA TC 2; Schedule 40 PVC
- C. Fittings and Conduit Bodies: NEMA TC 3

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation".
- B. Install nonmetallic conduit in accordance with manufacturers' instructions.
- C. Arrange supports to prevent misalignment during wiring installation.

- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 260529.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
- J. Route exposed conduit parallel and perpendicular to walls.
- K. Route conduit in and under slab from point-to-point.
- L. Do not cross conduits in slab unless $\frac{3}{4}$ " trade size.
- M. Maintain adequate clearance between conduit and piping.
- N. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F.
- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- R. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch trade size.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses, control and expansion joints.
- V. Conduits shall be sloped in such a manner that water may drain to the closest pull box if possible.

- W. Provide suitable pull string in each empty conduit except sleeves and nipples.
- X. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Y. Ground and bond conduit under provisions of Section 260526.
- Z. Identify conduit under provisions of Section 260553.
- AA. Flexible conduit, non-metallic, liquid-tight, and metallic; shall not be used in lengths longer than 6 ft unless specifically approved. Flexible conduit is not to be used in place of neatly run rigid conduit.
- BB. Where called out on plans, provide cable terminators and/or sealing bushings, CRC by O-Z/Gedney or approved equal. Verify specific cable outside diameters and follow manufacturer's installation requirements.

END OF SECTION 260533

SECTION 260534 - PULL, JUNCTION BOXES AND ENCLOSURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pull Boxes
- B. Junction Boxes
- C. Accessories

1.2 RELATED SECTIONS

- A. Section 260529 - Supporting Devices

1.3 REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
- B. NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems
- C. ANSI/NFPA 70 - National Electrical Code

1.4 SUBMITTALS

- A. Submit under provisions of general project requirements and Section 260500.
- B. Product Data: Provide manufacturer's standard data for boxes and enclosures.
- C. Junction box locations and details
 - 1. Terminal block layout
 - 2. Grounding

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Hoffman
- B. Rittal
- C. Or Equal

2.2 PULL BOXES

- A. Construction:
 - 1. Outdoors, Wet Damp areas, Corrosive areas. NEMA Type 4/4X, sunlight resistant fiberglass, polycarbonate or SS as specified on Drawings, enclosure with continuous hinge covers.
 - a. Covers: Continuous SS hinge, held closed by SS screws
 - 2. Indoors exposed NEMA 12, 13 or as specified on Drawings.
 - 3. Indoors flush wall mounted NEMA 1 w/ flush covers
 - 4. Indoors concealed NEMA 1 w/ screw cover
 - 5. Indoor wet and damp NEMA 4XSS
 - 6. Indoor corrosive areas NEMA 4XSS or compatible with chemical
 - 7. Hazardous locations NEMA 7

2.3 TERMINAL HINGED COVER ENCLOSURES

- A. Construction:
 - 1. Outdoor, Wet Damp areas, Corrosive areas. NEMA 4/4X, sunlight resistant fiberglass or polycarbonate or SS as specified on Drawings, Type 4/4X enclosure with continuous hinge cover.
 - a. Covers: Continuous SS hinge, held closed by flush latch operable by screwdriver.
 - 2. Indoors exposed NEMA 12, 13
 - 3. Indoors flush wall mounted NEMA 1 w/ flush covers
 - 4. Indoors concealed NEMA 1 w/ screw cover
 - 5. Indoor wet and damp NEMA 4XSS
 - 6. Indoor corrosive areas NEMA 4XSS or compatible with chemical
 - 7. Hazardous locations NEMA 7
- B. Provide white enamel interior metal panel for mounting terminal blocks and electrical components.

2.4 CABINETS

- A. Provide metal barriers to form separate compartments containing control wiring at less than 50 volts from power wiring.

- B. Provide accessory feet for free-standing equipment.

2.5 TERMINAL BLOCKS

- A. Manufacturers:
 - 1. Weidmüller SAK 6, SAK 2.5, ASK 1
 - 2. Allen-Bradley
 - 3. Phoenix Contact
 - 4. Square D
 - 5. Or equal
- B. Terminal Blocks: ANSI/NEMA ICS 4
- C. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.
- D. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts. Ground terminal shall be green.
- E. Provide ground bus terminal block, with each connector bonded to enclosure.
- F. Provide a typed legend of cables and terminal numbers with origin and destination.
- G. Boxes where water may drain from the attached conduits shall have drains installed in the bottom or the lowest point of the box. Conduit penetration at such boxes shall be located along the sides or top of the box. Conduits shall not be installed in a manner that water can enter attached pull conduits.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner.
- C. Do not attach boxes directly to masonry, concrete, or brick walls but provide a ¼" spacer of PVC, nylon, or stainless steel.
- D. Install enclosures and boxes using stainless steel fasteners.
- E. Provide supports where required when no wall or other adequate support is available.

END OF SECTION 260534

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates and labels
- B. Wire and cable markers
- C. Conduit markers

1.2 REFERENCES

- A. NFPA 70 - National Electrical Code

1.3 SUBMITTALS

- A. Submit under provisions of Section 260500.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 NAMEPLATES AND LABELS

- A. Nameplates:
 - 1. Equipment Identification: Engraved three-layer laminated plastic, black letters on white background
 - 2. Emergency Powered Equipment: Engraved three-layer laminated plastic, black letters on red background, as required by NEC
 - 3. Equipment power source identification: Engraved three-layer laminated plastic, black letters on yellow background
- B. Locations:
 - 1. Each electrical distribution and control equipment enclosure
 - 2. Junction box

- C. Letter Size:
 - 1. Use 1/8-inch letters for identifying individual equipment and loads.
 - 2. Use 1/4-inch letters for identifying grouped equipment and loads.
- D. Labels: Embossed adhesive tape, with 3/16-inch white letters on black background. Use only for identification of individual wall switches and receptacles, and control device stations.

2.2 WIRE MARKERS

- A. Manufacturers:
 - 1. T & B Shrink-Kon HVM wire markers
 - 2. Panduit - Pan Code HSDL
 - 3. Brady
- B. Description: Tubing type wire markers
- C. Locations: Each conductor at panelboard gutters, outlet and junction boxes, terminal strip and each load connection
- D. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on Drawings.
 - 2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings or on shop drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

- A. Install nameplate parallel to equipment lines.
- B. Secure nameplate to equipment front using stainless steel screws, rivets, or adhesive.
- C. Identify underground conduits using foil backed underground warning tape. Install one tape per trench at 6 inches below finished grade.

END OF SECTION 260553

SECTION 262213 - DRY-TYPE TRANSFORMERS (600V AND LESS)

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 the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:
 - 1. Distribution transformers
 - 2. Control and signal transformers

1.3 SUBMITTALS

- A. Product Data Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.
- B. Shop Drawings: Wiring and connection diagrams
- C. Source quality-control test reports
- D. Output Settings Reports: Record of tap adjustments specified in Part 3

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with IEEE C 57.12.91
- C. Energy-Efficient Transformers Rated 15 kVA and Larger: Certified as meeting NEMA TP 1, Class 1 efficiency levels when tested according to NEMA TP 2

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.
- B. Coordinate installation of wall-mounting and structure-hanging supports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical
 - 2. Siemens Energy & Automation, Inc.
 - 3. Square D / Schneider
 - 4. Engineer Approved Equal

2.2 MATERIALS

- A. Description: Factory-assembled and -tested, air-cooled units for 60 Hz service
- B. Cores: Grain-oriented, non-aging silicon steel
- C. Coils: Continuous windings without splices, except for taps
 - 1. Internal Coil Connections: Brazed or pressure type
 - 2. Coil Material: Copper

2.3 DISTRIBUTION TRANSFORMERS

- A. Comply with NEMA ST 20, and list and label as complying with UL 1561.
- B. Cores: One leg per phase
- C. Enclosure: Ventilated, drip-proof, NEMA 250, Type 2
- D. Indoor Transformer Enclosure Finish: Comply with NEMA 250 for "Indoor Corrosion Protection"
 - 1. Finish Color: Gray
- E. Insulation Class: 220°C, UL-component-recognized insulation system with a maximum of 150°C rise above 40°C ambient temperature
- F. Taps for Transformers Smaller Than 3 kVA: One 5-percent tap above normal full capacity
- G. Taps for Transformers 7.5 to 24 kVA: One 5-percent tap above and one 5-percent tap below normal full capacity

- H. Taps for Transformers 25 kVA and Larger: Two 2.5-percent taps above and four 2.5-percent taps below normal full capacity
- I. Select features from six paragraphs and associated subparagraphs below. Coordinate with Drawings.
- J. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.
 - 1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
 - 2. Include special terminal for grounding the shield.
 - 3. Shield Effectiveness:
 - a. Capacitance between Primary and Secondary Windings: Not to exceed 33 picofarads over a frequency range of 20 Hz to 1 MHz
 - b. Common-Mode Noise Attenuation: -120 dBA minimum at 0.5 to 1.5 kHz; -65 dBA minimum at 1.5 to 100 kHz
 - c. Normal-Mode Noise Attenuation: -52 dBA minimum at 1.5 to 10 kHz
- K. Wall Brackets: Manufacturer's standard brackets

2.4 CONTROL AND SIGNAL TRANSFORMERS

- A. Description: Self-cooled, two-winding dry type, rated for continuous duty, complying with NEMA ST 1, and listed and labeled as complying with UL 506
- B. Ratings: Continuous duty. If rating is not indicated, provide at least 50 percent spare capacity above connected peak load.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect transformers according to IEEE C57.12.91.
- B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure and ambient temperature requirements for each transformer.
- B. Verify that field measurements are as-needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Examine walls and floors for suitable mounting conditions where transformers will be installed.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - 1. Brace wall-mounting transformers as specified in Division 26 Section "Electrical Supports".
- B. Install floor-mounting transformers level on concrete bases not less than 2 inches larger in both directions than supported unit and 4 inches high.
 - 1. Anchor transformers to concrete bases according to manufacturer's written instructions.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding".
- B. Connect wiring according to Division 26 Section "Conductors and Cables".
- C. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 ADJUSTING

- A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 5 percent. Submit recording and tap settings as test results.
- B. Output Settings Report: Prepare a written report recording output voltages and tap settings.

END OF SECTION 262213

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wall switches
- B. Receptacles
- C. Device plates

1.2 REFERENCES

- A. NECA - Standard of Installation
- B. NEMA WD 1 - General Requirements for Wiring Devices
- C. NEMA WD 6 - Wiring Device -- Dimensional Requirements
- D. NFPA 70 - National Electrical Code

1.3 SUBMITTALS FOR REVIEW

- A. Follow requirements for procedures for submittals.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Provide Products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch. Single Pole listed, 3 and 4-Way similar.
 - 1. Ratings:
 - a. Voltage: 120-277 volts, AC, 20 amperes

2. Type:
 - a. Body and Handle: Ivory plastic with toggle handle
 - 1) Manufacturers:
 - a) Hubbell – 1221I
 - b) Pass & Seymour – 20AC1-I
 - 2) Leviton
 - 3) Or approved equal
 - b. Indicator Light: Lighted handle type switch; RED handle or IVORY handle
 - 1) Manufacturers:
 - a) Hubbell – 1221PL, IL
 - b) Pass & Seymour – 20AC1-RPL , ISL
 - c) Leviton
 - d) Or approved equal

2.2 RECEPTACLES

- A. Two-pole, 3-wire Grounding, straight blade, heavy duty specification grade, duplex receptacle.
 1. Rating:
 - a. 120 volts AC, 20 amps
 2. Type:
 - a. Duplex Receptacle
 - 1) Manufacturers:
 - a) Hubbell 5362
 - b) Pass & Seymour 5362
 - c) Leviton
 - d) Or approved equal
 3. Ground Fault Circuit Interrupting two pole, 3-wire Grounding, 20-amp, 125-volt, heavy duty specification grade, duplex receptacle.
 - a. Manufacturers:
 - 1) Hubbell GF5362
 - 2) Pass & Seymour, 2091-S
 - 3) Leviton
 - 4) Or approved equal
 4. Pre-wired nonmetallic receptacle raceway: Six-foot, 3-wire, single circuit 20-receptacle on 12" c/c spacing.
 - a. Manufacturers:
 - 1) Hubbell PT6112
 - 2) Wiremold NM24GB612
 - 3) Or approved equal

2.3 WALL PLATES

- A. Receptacles
 1. Decorative Cover Plate: Smooth stainless steel
 2. Jumbo Cover Plate: Smooth stainless steel
 3. Weatherproof covers in use

- B. Wall Switches
 - 1. Decorative Cover Plate: Smooth stainless steel
 - 2. Jumbo Cover Plate: Smooth stainless steel
 - 3. Weatherproof covers for outdoor locations

2.4 TELEPHONE & DATA

- A. Jacks
 - 1. Hubbell Premise wiring FPL series with color coded HPW jacks
 - 2. Weatherproof covers

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that outlet boxes are installed at proper height.

3.2 PREPARATION

- A. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation".
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install receptacles with grounding pole on bottom.
- E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- F. Connect wiring devices by wrapping conductor around screw terminal.
- G. Install galvanized steel plates on junction boxes in unfinished areas, above accessible ceilings, and on surface mounted boxes.
- H. Install stainless steel plates on outlet boxes and switch boxes in unfinished areas and on surface mounted outlets.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes to obtain mounting heights.
- B. Install wall switch 48 inches above finished floor.
- C. Install convenience receptacle 18 inches above finished floor unless directed otherwise.

3.5 FIELD QUALITY CONTROL

- A. Follow requirements in general project requirements and Section 260500 for field inspection and testing.
- B. Inspect each wiring device for defects.
- C. Operate each wall switch with circuit energized and verify proper operation.
- D. Verify that each receptacle device is energized.
- E. Test each receptacle device for proper polarity.
- F. Test each GFCI receptacle device for proper operation.

3.6 CLEANING

- A. Follow requirements for Contract Closeout: Cleaning installed work.
- B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION 262726

SECTION 262913.06 - SOFT-START MOTOR CONTROLLERS

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 soft-start motor controllers that are designed for reduced-voltage start and full-voltage run duty.
 - 1. Enclosed soft-start controllers
 - 2. Combination soft-start controllers
 - 3. Bypass motor controller
 - 4. Enclosures
 - 5. Accessories
 - 6. Identification

1.3 DEFINITIONS

- A. CPT: Control power transformer
- B. FLA: Full-load current
- C. MCCB: Molded-case circuit breaker
- D. MCP: Motor circuit protector
- E. NC: Normally closed
- F. NO: Normally open
- G. OCPD: Overcurrent protective device
- H. SCCR: Short-circuit current rating
- I. SCPD: Short-circuit protective device
- J. SCR: Silicon-controlled rectifier

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each type of controller.

1. Include plans, elevations, sections, and mounting details.
2. Indicate dimensions, weights, required clearances, and location and size of each field connection.
3. Wire Termination Diagrams and Schedules: Include diagrams for signal and control wiring. Identify terminals and wiring designations and color codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.
4. Include features, characteristics, ratings, and factory settings of individual OCPD and auxiliary components.

C. Product Schedule: For each enclosed controller

1. Each installed soft-start controller type
2. NRTL listing
3. Factory-installed accessories
4. Nameplate legends
5. SCCR of integrated unit
 - a. For each combination soft-start controller, include features, characteristics, ratings, and factory setting of the SCPD and OCPD.
 - 1) Listing document proving Type 2 coordination.
 - b. For each series-rated combination, state the listed integrated SCCR (withstand) of SCPDs and OCPDs by an NRTL acceptable to authorities having jurisdiction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Seismic Qualification Data: Certificates, for soft-start controllers, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Source quality-control reports.

D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For soft-start controllers to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

- a. Routine maintenance requirements for soft-start controllers and installed components.
- b. Manufacturer's written instructions for testing and adjusting circuit-breaker and MCP trip settings.
- c. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage soft-start controllers.
- d. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate FLAs.
- e. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected

1.7 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. Fuses for Fused Switches: Equal to ten percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 2. Control Power Fuses: Equal to ten percent of quantity installed for each size and type, but no fewer than two of each size and type.
 - 3. Indicating Lights: Two of each type and color installed.
 - 4. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
 - 5. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store soft-start controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect soft-start controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover soft-start controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than 32°F (0°C) and not exceeding 104°F (40°C), humidity noncondensing.
 - 2. Altitude: Not exceeding 3300 feet (1000 m).
 - 3. The effect of solar radiation is insignificant.

PART 2 - PRODUCTS

2.1 MOTOR CONTROLLER PERFORMANCE REQUIREMENTS

- 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 use.
- B. UL Compliance: Fabricate and label enclosed controllers to comply with UL 508.
- C. NEMA Compliance: Fabricate motor controllers to comply with NEMA ICS 2.

2.2 ENCLOSED SOFT-START MOTOR CONTROLLERS

- A. Description: Controllers designed for reduced-voltage start, full-voltage run, and optional soft stop. The controller shall be an integrated unit with power SCRs, heat sink, microprocessor logic board, door-mounted digital display and user interface module, run-bypass contactor, and overload relay(s); suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.
 - 1. Run-Bypass Contactor: Magnetic contactor in parallel with the SCR of the soft-start controller, bypassing the SCR when full voltage is achieved.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton
 - 2. ABB
 - 3. Rockwell Automation, Inc.
 - 4. SIEMENS Industry, Inc.; Energy Management Division
 - 5. Square D; by Schneider Electric
 - 6. Approved Equal
- C. Standard: Comply with NEMA ICS 2, general purpose, Class A.
- D. Configuration: Standard duty
 - 1. At least two SCRs per phase to control the starting and stopping of the motor.
 - 2. Microprocessor control shall continuously monitor current and proper operation of the SCRs.
 - 3. Bypass Contactor: Operates automatically when full voltage is applied to motor, and bypasses the SCRs. Soft-start controller protective features and deceleration controls shall remain active when this contactor is in the bypass mode.

4. Power Electronics Disconnect Contactor. Where indicated, installed ahead of the power electronics equipment, and shall open automatically when the motor is stopped, or a controller fault is detected, or when an SCR shorts.
5. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
6. Surge Protection: Comply with NEMA ICS 2 requirements for surge suppression.

E. Control Power:

1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
2. Spare CPT Capacity: As indicated on Drawings, available in increments of 100 VA, from 100 to 500 VA.

F. Controller Diagnostics and Protection:

1. Microprocessor-based thermal-protection system for monitoring SCR and motor thermal characteristics, and providing controller overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
2. Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and under-load conditions; and line frequency over or under normal.
3. Input isolation contactor that opens when the controller diagnostics detect a faulted soft-start component or when the motor is stopped.

G. Cover mounted-controller status panel with LED lights or alphanumeric display to show the following:

1. Starter Status: "Ready," "starting," "stopping," or "running"
2. Motor current in amperes
3. Faults:
 - a. Motor overcurrent trip
 - b. Motor thermal overload
 - c. Starter thermal fault
 - d. Low line voltage
 - e. Loss of a phase
 - f. Phases reversed
 - g. Maximum starting time exceeded
 - h. Communications error

H. Interface Panel: Mounted on controller door

1. Guarded adjustable set points, not readily accessible:
 - a. Motor FLA, adjustable from 40 to 125 percent of the controller's rating
 - b. Current limitation on starting, adjustable from 200 to 500 percent of FLA, typically set at 300 percent.
 - c. NEMA ICS 2 overload class. Selections shall include the following tripping classes: Class 5, Class 10, Class 15, Class 20, and Class 30.
2. Adjustable set points, password protected
 - a. Linear acceleration, adjustable from 1 to 60 s
 - b. Maximum start time, adjustable from 1 to 250 s
 - c. Selector switch; select coast to stop or soft stop

d. Linear deceleration, adjustable from 1 to 60 s

I. Remote Output Features. All outputs shall be prewired to terminal blocks.

1. Analog output for field-selectable assignment of motor operating characteristics; 4–20 mA DC.
2. Form C status contacts that change state when controller is running.
3. Form C alarm contacts that change state when a fault condition occurs.
4. Form C status contacts that change state when controller is in Auto mode.

2.3 COMBINATION SOFT-START MOTOR CONTROLLERS

A. Description: Factory-assembled, combination, reduced-voltage soft-start controller with a disconnecting means, SCPD and OCPD, in a single enclosure. The reduced-voltage soft-start controller shall consist of an integrated unit with power SCRs, heat sink, microprocessor logic board, door-mounted digital display and user interface module, run-bypass contactor, and overload relay(s); suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.

1. Run-Bypass Contactor: Magnetic contactor in parallel with the SCR of the soft-start controller, bypassing the SCR when full voltage is achieved.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton
2. General Electric Company
3. Rockwell Automation, Inc.
4. SIEMENS Industry, Inc.; Energy Management Division
5. Square D; by Schneider Electric
6. ABB
7. Approved Equal

C. Standard: Comply with NEMA ICS 2, general purpose, Class A.

D. Configuration: Standard duty

1. At least two SCRs per phase to control the starting and stopping of the motor
2. Microprocessor control shall continuously monitor current and proper operation of the SCRs.
3. Bypass Contactor: Operates automatically when full voltage is applied to motor and bypasses the SCRs. Soft-start controller protective features and deceleration controls shall remain active when this contactor is in the bypass mode.
4. Power Electronics Disconnect Contactor. Where indicated, installed ahead of the power electronics equipment, and shall open automatically when the motor is stopped, or a controller fault is detected, or when an SCR short circuits.
5. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating
6. Surge Protection: Comply with NEMA ICS 2 requirements for surge suppression.

E. Control Power:

1. For on-board control power, obtain from line circuit or from integral CPT. The CPT shall have capacity to operate integral devices and remotely located pilot, indicating, and control devices.
2. Spare CPT Capacity: As indicated on Drawings, available in increments of 100 VA, from 100 to 500 VA.

F. Controller Diagnostics and Protection:

1. Microprocessor-based thermal-protection system for monitoring SCR and motor thermal characteristics and providing controller overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
2. Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and under-load conditions; and line frequency over or under normal.
3. Input isolation contactor that opens when the controller diagnostics detect a faulted soft-start component or when the motor is stopped.

G. Cover mounted-controller status panel with LED lights or alphanumeric display to show the following:

1. Starter Status: "Ready," "starting," "stopping," or "running"
2. Motor current in amperes
3. Faults:
 - a. Motor overcurrent trip
 - b. Motor thermal overload
 - c. Starter thermal fault
 - d. Low line voltage
 - e. Loss of a phase
 - f. Phases reversed
 - g. Maximum starting time exceeded

H. Interface Panel: Mounted on controller door

1. Guarded adjustable set points, not readily accessible.
 - a. Motor FLA, adjustable from 40 to 125 percent of the controller's rating.
 - b. Current limitation on starting, adjustable from 200 to 500 percent of FLA, typically set at 300 percent.
 - c. NEMA ICS 2 overload class. Selections shall include the following tripping classes: Class 5, Class 10, Class 15, Class 20, and Class 30.
2. Adjustable set points, password protected
 - a. Linear acceleration, adjustable from 1 to 60 s
 - b. Maximum start time, adjustable from 1 to 250 s
 - c. Selector switch; select coast-to-stop or soft stop
 - d. Linear deceleration, adjustable from 1 to 60 s

I. Remote Output Features: All outputs shall be prewired to terminal blocks.

1. Analog output for field-selectable assignment of motor operating characteristics; 4-20 mA DC
2. Form C status contacts that change state when controller is running.
3. Form C alarm contacts that change state when a fault condition occurs.
4. Form C status contacts that change state when controller is in Auto mode.

J. Fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J fuses.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
3. Auxiliary Contacts: NO or NC, arranged to activate before switch blades open.

K. MCP Disconnecting Means:

1. UL 489 and NEMA AB 3 (with interrupting capacity to comply with available fault currents) instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
3. Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
4. NO alarm contact that operates only when MCP has tripped.
 - a. Current-limiting module to increase controller SCCR (withstand) to 100 kA

L. MCCB Disconnecting Means:

1. UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
2. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
3. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
4. Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
5. NO alarm contact that operates only when MCCB has tripped.

M. Molded-Case Switch Disconnecting Means:

1. UL 489 and NEMA AB 3, with in-line fuse block for Class J or Class L power fuses (depending on ampere rating), providing an interrupting capacity to comply with available fault currents; MCCB with fixed, high-set instantaneous trip only.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
3. Auxiliary contacts "a" and "b" arranged to activate with molded-case switch handle.
4. NO alarm contact that operates only when molded-case switch has tripped.

2.4 BYPASS MOTOR CONTROLLER

- A. Description: Factory-assembled, combination, full-voltage electromagnetic motor controller with a disconnecting means, SCPD and OCPD, in a single enclosure. Connected as a bypass controller, operating manually, with NORMAL/BYPASS selector switch.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Eaton
 - 2. General Electric Company
 - 3. Rockwell Automation, Inc.
 - 4. SIEMENS Industry, Inc.; Energy Management Division
 - 5. Square D; by Schneider Electric
 - 6. ABB
- C. Standard:
 - 1. Comply with NEMA ICS 2, general purpose, Class A.
 - 2. Fabricate and label the bypass motor controllers to comply with UL 60947-4-1.
- D. Configuration: Across-the-line start, electrically held.
- E. Contactor Coils: Pressure-encapsulated type with coil transient suppressors when indicated
 - 1. Operating Voltage: Manufacturer's standard unless otherwise indicated
- F. Control Power: 120VAC; obtained from integral CPT, with primary and secondary fuses, and with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1. Spare CPT Capacity: As indicated on Drawings, 100 VA.
- G. Overload Relays:
 - 1. Thermal-Overload Relays:
 - a. Inverse-time-current characteristic
 - b. Class 20 tripping characteristic
 - c. Heaters in each phase shall be matched to nameplate FLA of actual protected motor and with appropriate adjustment for duty cycle
 - d. Ambient compensated
 - e. Automatic resetting
 - 2. Solid-State Overload Relays:
 - a. Switch or dial selectable for motor running overload protection
 - b. Sensors in each phase
 - c. Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
- H. Class II Ground-Fault Protection: Comply with UL 1053 to interrupt low-level ground faults. The ground-fault detection system shall include circuitry that will prevent the motor controller from tripping when the fault current exceeds the interrupting capacity of

the controller. Equip with start and run delays to prevent nuisance trip on starting, and a trip indicator.

I. Fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate indicated fuses.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

J. Non-fusible Disconnecting Means:

1. NEMA KS 1, heavy-duty, horsepower-rated, non-fusible switch.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

J. MCP Disconnecting Means:

1. UL 489 and NEMA AB 3 (with interrupting capacity to comply with available fault currents) instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
2. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

K. MCCB Disconnecting Means:

1. UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
2. Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
3. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

2.5 ENCLOSURES

- A. Comply with NEMA 250, Type designations as indicated on Drawings, to comply with environmental conditions at installed location.
- B. Construction of the enclosures shall comply with NEMA ICS 6.
- C. Controllers in hazardous (classified) locations shall comply with UL 1203.

2.6 ACCESSORIES

- A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 1. Push Buttons, Pilot Lights, and Selector Switches: Standard duty, except as needed to match enclosure type. Heavy-duty or oiltight where indicated in the controller schedule.
 - a. Push Buttons: As indicated in the controller schedule.
 - b. Pilot Lights: As indicated in the controller schedule.

2. Elapsed Time Meters: Heavy duty with digital readout in hours; nonresettable
 3. Meters: Panel type, 2-½ inch (64-mm) minimum size with 90- or 120-degree scale and plus or minus 2 percent accuracy. Where indicated, provide selector switches with an off position.
- B. Breather assemblies, to maintain interior pressure and release condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
 - C. Space heaters, with NC auxiliary contacts, to mitigate condensation in Type 4X enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
 - D. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.

2.7 IDENTIFICATION

- A. Controller Nameplates: Laminated acrylic or melamine plastic signs, as described in Section 260553 "Identification for Electrical Systems," for each compartment, mounted with corrosion-resistant screws.
- B. Arc-Flash Warning Labels:
 1. Comply with requirements in Section 260573.19 "Arc-Flash Hazard Analysis." Produce a 3-½-by-5-inch (89-by-127-mm) self-adhesive label for each work location included in the analysis.
 2. Comply with requirements in Section 260553 "Identification for Electrical Systems." Produce a 3-½-by-5-inch (89-by-127-mm) self-adhesive equipment label for each work location included in the analysis. Labels shall be machine printed, with no field-applied markings.
 - a. The label shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD," and shall include the following information taken directly from the arc-flash hazard analysis:
 - 1) Location designation
 - 2) Nominal voltage
 - 3) Flash protection boundary
 - 4) Hazard risk category
 - 5) Incident energy
 - 6) Working distance
 - 7) Engineering report number, revision number, and issue date
 - b. Labels shall be machine printed, with no field-applied markings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and space conditions for compliance with requirements for motor controllers, their relationship with the motors, and other conditions affecting performance of the Work.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Wall-Mounted Controllers: Install controllers on walls with tops at uniform height indicated, and by bolting units to wall or mounting on slotted support systems complying with Section 260529 "Hangers and Supports for Electrical Systems," and bolted to wall.
- C. Freestanding Controllers: Provide slotted support systems complying with Section 260529 "Hangers and Supports for Electrical Systems."
- D. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- E. Control Wiring: Separate control wiring from power wiring. Where unavoidable, use twisted pair cabling or shielded cables for control wiring.
- F. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- G. Setting of Overload Relays: Select and set overloads on the basis of FLA rating as shown on motor nameplate. Adjust setting value for special motors as required by NFPA 70 for high-torque, high-efficiency, and so on motors.

3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
- E. Tests and Inspections:
 - 1. Comply with provisions of NFPA 70B, Chapter "Testing and Test Methods."
 - 2. Visual and Mechanical Inspection:
 - a. Compare equipment nameplate data with Drawings and the Specifications.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, and grounding.
 - d. Verify that the unit is clean.
 - e. Ensure that vent path openings are free from debris and that heat-transfer surfaces are clean.
 - f. Verify correct connections of circuit boards, wiring, disconnects, and ribbon cables.
 - g. Inspect Contactors:
 - 1) Verify mechanical operation.
 - 2) Verify that contact gap, wipe, alignment, and pressure are according to manufacturer's published data.
 - h. Motor-Running Protection:
 - 1) Verify that motor FLA is at, or under, the controller current rating.
 - 2) Verify that overload element setting is correct for its application.
 - 3) Apply minimum- and maximum-speed set points. Verify that set points are within limitations of the load coupled to the motor.
 - 4) If motor-running protection is provided by fuses, verify correct fuse rating.
 - i. Inspect bolted electrical connections for high resistance using one of the following two methods:
 - 1) Use a low-resistance ohmmeter. Compare bolted-connection-resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data or NETA ATS, Table 100.12. Bolt-torque levels shall be according to manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS, Table 100.12.
 - j. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
 - 3. Electrical Tests:
 - a. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Insulation-resistance values shall be according to manufacturer's published data or NETA ATS, Table 100.1. In the absence of manufacturer's published data, use Table 100.5. Values of insulation resistance less than this table or manufacturer's written instructions shall be investigated and corrected.
 - b. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - c. Test motor protection devices according to manufacturer's published data.

- d. Test circuit breakers as follows:
 - 1) Operate the circuit breaker to ensure smooth operation.
 - 2) For adjustable circuit breakers, adjust protective device settings according to the coordination study. Comply with coordination study recommendations.
 - e. Test the electronic motor overload relay elements by injecting primary current through the overload circuit and monitoring trip time of the overload element.
 - f. Test the following parameters according to NETA relay calibration procedures, or as recommended by manufacturer:
 - 1) ANSI No. 49R, Overtemperature Protection:
 - a) Determine time delay at 300 percent of setting.
 - b) Determine a second point on the operating curve.
 - c) Determine pickup.
 - 2) ANSI No. 47, Input Phase Loss and Reversed Phases Protection:
 - a) Determine positive sequence voltage to close the NO contact.
 - b) Determine positive sequence voltage to open the NC contact (undervoltage trip).
 - c) Verify negative sequence trip.
 - d) Determine time delay to close the NO contact with sudden application of 120 percent of pickup.
 - e) Determine time delay to close the NC contact on removal of voltage when previously set to rated system voltage.
 - 3) ANSI No. 81, Overfrequency Protection:
 - a) Verify frequency set points.
 - b) Determine time delay.
 - c) Determine undervoltage cutoff.
 - 4) Fault Alarm Outputs: Verify that each relay contact performs its intended function in the control scheme including breaker trip tests, close inhibit tests, lockout tests, and alarm functions.
 - g. Perform operational tests by initiating control devices.
4. Infrared Inspection: Perform the survey during periods of maximum possible loading. Remove all necessary covers prior to the inspection.
- a. Comply with recommendations of NFPA 70B, Chapter "Testing and Test Methods," Article "Infrared Inspection."
 - b. After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared inspection of the electrical power connections of each motor controller.
 - c. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor controller 11 months after date of Substantial Completion.
 - d. Report of Infrared Inspection: Prepare a certified report that identifies the testing technician and equipment used, and lists the following results:
 - 1) Description of equipment to be tested.
 - 2) Discrepancies.
 - 3) Temperature difference between the area of concern and the reference area.
 - 4) Probable cause of temperature difference.

- 5) Areas inspected. Identify inaccessible and unobservable areas and equipment.
 - 6) Identify load conditions at time of inspection.
 - 7) Provide photographs and thermograms of the deficient area.
 - 8) Recommended action.
- e. Equipment: Inspect distribution systems with imaging equipment capable of detecting a minimum temperature difference of 1°C at 30°C. The equipment shall detect emitted radiation and convert detected radiation to a visual signal.
 - f. Act on inspection results, recommended action, and considering recommendations of NETA ATS, Table 100.18. Correct possible and probable deficiencies as soon as Owner's operations permit. Retest until deficiencies are corrected.
- F. Motor controllers will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.

3.5 SYSTEM FUNCTION TESTS

- A. System function tests shall prove the correct interaction of sensing, processing, and action devices. Perform system function tests after field quality-control tests have been completed and all components have passed specified tests.
1. Develop test parameters and perform tests for the purpose of evaluating performance of integral components and their functioning as a complete unit within design requirements and manufacturer's published data.
 2. Verify the correct operation of interlock safety devices for fail-safe functions in addition to design function.
 3. Verify the correct operation of sensing devices, alarms, and indicating devices.
- B. Motor controllers will be considered defective if they do not pass the system function tests and inspections.
- C. Prepare test and inspection reports.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor controllers.

SECTION 263213.16 - GAS-ENGINE-DRIVEN GENERATOR SETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. Division 26 Basic Electrical Materials and Methods sections apply to work specified in this section.

1.2 SUMMARY

- A. Extent of engine generator set work is indicated by drawings and schedules, and is hereby defined to include, but not by way of limitation, natural gas fuel engine, electrical generator, engine starting system including batteries, instrument control panel, weather-protective housing, transfer switches, main circuit breaker, annunciator panel, exhaust silencer, and accessories.
- B. Types of generator set required for the project include the following:
 - 1. Natural gas fuel engine-driven generator
- C. Concrete and grout for engine-driven generator pads, foundations, frames and bedplates are specified in Division 3 "Concrete" sections.
- D. Refer to Division 3 sections for concrete and grout work required in connection with engine-driven generator sets; not work of this section.
- E. Vibration control for engine-driven generator units including pads, springs, rails, bases, hangers, and connectors are specified in Division 23 section pertaining to vibration control and isolation.
- F. Refer to Division 23 section for vibration control and isolation required in connection with engine-driven generator units; not work of this section.

- G. Refer to other Division 26 sections for wires/cables, electrical boxes and fittings, and wiring devices which are required in conjunction with engine-generator work; not work of this section.

1.3 SUBMITTALS

- A. **Product Data:** Submit manufacturer's data on engine-driven generator sets and components. Include manufacturer's standard product warranty, for duration of not less than one-year, for replacement of materials and equipment used in engine generator systems.
- B. **Shop Drawings:** Submit layout drawings of engine-driven generator units and accessories including, but not limited to, automatic transfer switches, fuel line piping, remote start-stop stations, and instrumentation. In addition, show engine generator set units and their spatial relationship to associated equipment. Allow adequate clearance space for removal of engine generator elements for maintenance purposes.
- C. **Wiring Diagrams:** Submit wiring diagrams for engine-driven generator units showing connections to electrical power panels, feeders, automatic transfer switches, and ancillary equipment. Differentiate between portions of wiring that are manufacturer- installed and portions that are field-installed.
- D. **Agreement to Maintain:** Prior to time of final acceptance, the Installer shall submit 4 copies of an agreement for continued service and maintenance of engine-driven generator sets, for Owner's possible acceptance. Offer terms and conditions for furnishing parts and providing continued testing and servicing, including replacement of materials and equipment, for one-year period with option for renewal of Agreement by Owner.
- E. **Certifications:** Provide engine-driven generator sets certified test record of the following final production testing:
 - 1. Single-step load pickup
 - 2. Transient and steady-state governing
 - 3. Safety shutdown device testing
 - 4. Voltage regulation
 - 5. Rated power

6. Maximum power

- F. Provide certified test record prior to engine-driven generator set being shipped from factory to project location.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of engine-driven generator units and ancillary equipment, of types, ratings and characteristics required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with engine-driven generator units similar to that required for this project.
1. Agreement to Maintain: Engage Installer who is willing to execute with the Owner, required agreement for continued maintenance of engine-driven generator units.
- C. Codes and Standards:
1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 517, 700, 701, and 702 pertaining to construction and installation of emergency and standby systems.
2. NFPA Compliance: Comply with applicable requirements of NFPA 37, "Installation and Use of Stationary Combustion Engines and Gas Turbines," NFPA 99, "Standard for Health Care Facilities," NFPA 101, "Code for Safety to Life from Fire in Buildings and Structures", and NFPA 110, "Emergency and Standby Power Systems".
3. UL Compliance: Comply with applicable requirements of UL 1008, "Automatic Transfer Switches," UL 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors," and UL 486B, "Wire Connectors for Use with Aluminum Conductors."
4. ANSI/NEMA Compliance: Comply with applicable requirements of ANSI/NEMA MG 1, "Motors and Generators," and MG 2, "Safety and Use of Electric Motors and Generators."

- D. NEMA Compliance: Comply with applicable requirements of NEMA's Stds. Pub No. 250, "Enclosures for Electrical Equipment (1000-Volts Maximum)."
- E. IEEE Compliance: Comply with applicable portions of IEEE Std 446, "IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications."

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver engine-driven generators properly packaged and mounted on pallets, or skids to facilitate handling of heavy items. Utilize factory-fabricated type containers or wrappings for engine-generator and components which protect equipment from damage.
- B. Store engine-driven generator equipment in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle engine-driven generator equipment carefully to prevent physical damage to equipment and components. Do not install damaged equipment; remove from site and replace damaged equipment with new.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide engine generator sets of one of the following (for each rating of generator set):
 - 1. Caterpillar Tractor Co.
 - 2. Cummins Engine Co.
 - 3. Detroit Diesel Allison Div.; GM Corp.
 - 4. Empire Generator Co.
 - 5. Katolight Corp.
 - 6. Rehlko Co.

7. Generac Power Systems, Inc.
8. Power Distribution, Inc.
9. Waukesha-Engine Div.; Dresser Industries Inc.

B. Engine Generator Sets:

1. General: Except as otherwise indicated, provide manufacturer's standard engine-driven generator set and auxiliary equipment as indicated by published product information, and as required for a complete installation.
2. Engine-Driven Generator: Provide packaged electrical power diesel engine-driven generator assembly unit as indicated, rated 100 kW, 385 kVA, at a governed speed of 1800 RPM and rated 80 percent power factor for continuous operation, 277/480-volt, 3-phase, 4-wire, 60 Hz, 150 amperes at 615 feet altitude, at 85°F (29 °C).
 - a. Equip generator with 4-cycle, 8-cylinder, 1800 RPM, 204 HP engine, and fueled with natural gas. Provide unit-mounted radiator, blower fan, water pump, thermostat, and radiator duct flange capable of cooling engine with up to 0.5 inches water static pressure on fan. Connect engine drive directly to 4-pole revolving-field type single, maintenance-free, bearing generator through semi-flexible steel disk coupling.
 - b. Equip set with associated control equipment to automatically start engine, transfer load to standby power upon failure of normal power source, transfer load back to normal power upon its restoration, and stop engine.
 - c. Cushion-mount engine-generator on heavy steel base with vibration isolators to reduce possibility of torsional vibration. Provide water-cooled type engine with unit mounted radiator.
 - d. Equip engine with low oil pressure, high water temperature, and automatic overspeed safety shutdown devices.
 - e. Equip generator with excitor and voltage regulator to maintain voltage within 2 percent of rated value.
 - f. Provide unit capable of voltage recovery, within regulated range, of 7 seconds following sudden load increase from 0 to 100 percent of rated load, and with voltage dip not to exceed 20 percent upon application of rated load at rated power factor.

g. Construct unit in compliance with applicable standards; and with additional construction features as indicated:

- 1) Starting System: Provide engine-generator unit with 12-volt, 3-wire, negative ground, starting system including 12-volt positive engagement solenoid shift-starting motor, batteries and 35-ampere or greater automatic battery charging alternator with solid-state voltage regulation.
- 2) Instrument Control Panel – Provide engine-generator unit with the following:
 - a) Engine oil pressure and water temperature indicators
 - b) Battery charge-rate ammeter
 - c) START - STOP switch for manual operation of unit
 - d) Reset circuit breaker
 - e) Static voltage regulator
 - f) Voltage-adjusting rheostat
 - g) Voltmeter
 - h) Ammeter with phase selector switch with an OFF position
 - i) Running time indicator
 - j) Frequency meters

Select circuitry of plug-in design capable of quick replacement and of accepting a plug-in device which allows maintenance to test control panel performance without operating the engine.

2.2 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, weatherproof aluminum or steel housing, wind-resistant up to 150 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure. The generator set shall be supplied with a Sound Attenuated Enclosure, providing a sound pressure of 80 dB(A) while the generator is operating at 100% load at 7 meters (23 feet).

B. Description: Prefabricated enclosure with the following features:

1. Construction: Galvanized-steel, metal-clad, or aluminum, integral structural steel-framed building erected on concrete foundation.
2. Structural Design and Anchorage: Comply with ASCE 7 for wind loads.
3. Louvers: Equipped with bird screen and filter arranged to permit air circulation when engine is not running while excluding exterior dust, birds, and rodents
4. Hinged Doors: With padlocking provisions
5. Ventilation: Louvers equipped with bird screen and filter arranged to permit air circulation while excluding exterior dust, birds, and rodents
6. Thermal Insulation: Manufacturer's standard materials and thickness selected to maintain winter interior temperature within operating limits required by engine-generator-set components

C. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.

1. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.

D. Convenience Outlets: GFCI. Arrange for external electrical connection.

2.3 ENGINE-GENERATOR SET ACCESSORIES

- A. Equip unit with trickle-charger, and with indicator for starting battery, test switch for manual simulation of power outages including standby unit operation and load transfer, and time-clock exerciser circuit for automatic periodic exercise of engine-generator unit.
- B. Provide engine block heater, of wattage and voltage indicated, with thermostatic controls to maintain engine coolant at proper temperature to fulfill start-up requirements of NFPA 99.

- C. Provide auxiliary relay with 2 N.C. and 2 N.O. contacts for generator status indication on Owner's remote alarm and control panel. This relay shall be energized only during "actual" power failure and generator starting and not during generator testing or automatic periodic exercise of engine-generator unit.
- D. Provide on-unit-mounted 16-light annunciator panels with visual and audible alarms to monitor and warn of emergency operating conditions affecting line and generator power sources.
- E. Provide insulated exhaust silencers with drain and piping as shown, and of types and sizes indicated.
- F. Provide anchor bolts of galvanized steel of types and sizes indicated.
 - 1. Furnish anchor bolts to concrete formwork Installer with installation drawings and instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which engine-driven generator units are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION OF ENGINE-DRIVEN GENERATOR SETS

- A. Install engine-driven generator units as indicated, in accordance with the equipment manufacturer's written instructions, and with recognized industry practices to ensure that engine-generator units fulfill requirements. Comply with NFPA and NEMA standards pertaining to installation of engine-generator sets and accessories.
- B. Coordinate with other work including raceways, electrical boxes and fittings, piping and accessories, as necessary to interface installation of engine-generator equipment work with other work.

- C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std. 486A, B, and the National Electrical Code.
- D. Install units on vibration isolators in accordance with Division 23 section and comply with manufacturer's indicated method of installation.
- E. Connect natural gas piping to engine generator equipment as indicated and comply with manufacturer's installation instructions.
- F. Align shafts of engine and generator within tolerances recommended by engine-generator unit manufacturer.

3.3 GROUNDING

- A. Provide equipment grounding connections for engine-driven generator units as indicated. Tighten connections to comply with tightening torques specified in UL Std. 486A to assure permanent and effective grounding.

3.4 FIELD QUALITY CONTROL

- A. Start-up Testing:
 - 1. Engage local equipment manufacturer's representative to perform start-up and load tests upon completion of installation, with the Architect/Engineer in attendance; provide certified test record. Tests are to include the following:
 - a. Check fuel, lubricating oil, and antifreeze in liquid cooled models for conformity to the manufacturer's recommendations under environmental conditions present.
 - b. Test prior to cranking engine for proper operation, accessories that normally function while the set is in a standby mode. Accessories include: engine heaters, battery charger, generator strip heater, remote annunciator.
 - c. Check, during start-up test mode, for exhaust leaks, cooling air flow, movement during starting and stopping, vibration during running, normal and emergency line-to-line voltage and phase rotation.

- d. Test, by means of simulated power outage, automatic start-up by remote-automatic starting, transfer of load, and automatic shut-down. Prior to this test adjust, for proper system coordination, transfer switch timers. Monitor throughout the test, engine temperature, oil pressure, battery charge level, generator voltage, amperes, and frequency.
2. Upon completion of installation demonstrate capability and compliance of system with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise remove and replace with new units and proceed with retesting. Initial testing and retesting to be at no cost to Owner.

3.5 PERSONNEL TRAINING

- A. Operating Personnel Training: Train Owner's personnel in procedures for starting-up, testing and operating engine-driven generator sets. In addition, train Owner's personnel in periodic maintenance of batteries.

END OF SECTION 263213.16

SECTION 263623 – AUTOMATIC TRANSFER SWITCHES

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.
- B. Section 263213 - Packaged Engine Generator Systems

1.2 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
 - 1. Automatic transfer switches

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- C. Qualification Data: For manufacturer
- D. Field quality-control test reports
- E. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
 - 1. Features and operating sequences, both automatic and manual
 - 2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the Inter-

National Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- C. Source Limitations: Obtain automatic transfer switches through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Comply with NEMA ICS 1.
- F. Comply with NFPA 70.
- H. Comply with NFPA 110.
- I. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.5 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
 1. Notify Owner and Engineer no fewer than seven (7) days in advance of proposed interruption of electrical service.
 2. Do not proceed with interruption of electrical service without Owner's written permission.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. ABB
 2. ASCO / Emerson
 3. Cummins
 4. Cutler-Hammer
 5. Generac
 6. Kohler

7. Lakeshore
8. Russelelectric
9. Siemens

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
- B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
- C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of -20 to +70°C.
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 2. Switch Action: Double throw; mechanically held in both directions.
 3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
- G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.
- H. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- I. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.

- J. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
- K. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
- L. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color code or by numbered or lettered wire and cable tape markers at terminations. Color coding and wire and cable tape markers are specified in Division 26 Section "Electrical Identification."
 - 1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - 2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - 3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- M. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with Level 2 equipment according to NFPA 110.
- B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated (transfer switch shall not be switched neutral style).
- C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
- D. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
- E. Digital Communication Interface: Matched to capability of annunciator and control panel.
- F. Automatic Transfer-Switch Features:
 - 1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

2.4 SOURCE QUALITY CONTROL

- A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Equipment Mounting: Surface mount unless otherwise indicated.

3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding."
- C. Connect wiring according to Division 26 Section "Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform tests and inspections and prepare test reports.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- C. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
 - 2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
 - 5. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.

- d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.
 - g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
6. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
- a. Verify grounding connections and locations and ratings of sensors.

D. Testing Agency's Tests and Inspections:

- 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
- 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- 3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - a. Check for electrical continuity of circuits and for short circuits.
 - b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - c. Verify that manual transfer warnings are properly placed.
 - d. Perform manual transfer operation.
- 4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - b. Simulate loss of phase-to-ground voltage for each phase of normal source.
 - c. Verify time-delay settings.
 - d. Verify pickup and dropout voltages by data readout or inspection of control settings.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

SECTION 264313 - TRANSIENT VOLTAGE SUPPRESSION

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 TVSSs for low-voltage power, control, and communication equipment.

1.3 DEFINITIONS

- A. ATS: Acceptance Testing Specifications
- B. SVR: Suppressed voltage rating
- C. TVSS: Transient voltage surge suppressor

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.
- B. Product Certificates: For transient voltage suppression devices, signed by product manufacturer certifying compliance with the following standards:
 - 1. UL 1283
 - 2. UL 1449
- C. Qualification Data: For testing agency
- D. Field quality-control test reports, including the following:
 - 1. Test procedures used
 - 2. Test results that comply with requirements
 - 3. Failed test results and corrective action taken to achieve requirements
- E. Operation and Maintenance Data: For transient voltage suppression devices to include in emergency, operation, and maintenance manuals.
- F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements"
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use
- D. Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits"
- E. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices"
- F. Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Transient Voltage Surge Suppressors"

1.6 PROJECT CONDITIONS

- A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Replaceable Protection Modules: One of each size and type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Advanced Protection Technologies, Inc.
 - 2. Atlantic Scientific
 - 3. Current Technology, Inc.
 - 4. Cutler-Hammer, Inc.; Eaton Corporation
 - 5. Entrelec International
 - 6. General Electric Company
 - 7. Innovative Technology, Inc.
 - 8. Intermatic, Inc.
 - 9. LEA International
 - 10. Leviton Mfg. Company Inc.
 - 11. Liebert Corporation; a division of Emerson
 - 12. Northern Technologies, Inc.
 - 13. Siemens Energy & Automation, Inc.
 - 14. Square D; Schneider Electric
 - 15. Surge Suppression Incorporated
 - 16. Sutton Designs Inc.
 - 17. Transtector Systems, Inc.
 - 18. Tycor; Cutler-Hammer, Inc.
 - 19. United Power Corporation
 - 20. Zero Surge Inc.

2.2 SERVICE ENTRANCE SUPPRESSORS

- A. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:
 - 1. LED indicator lights for power and protection status
 - 2. Audible alarm, with silencing switch, to indicate when protection has failed
 - 3. One set of dry contacts rated at 5A and 250 VAC, for remote monitoring of protection status
- B. Surge Protection Device Description: Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories:
 - 1. Fuses, rated at 200 kA interrupting capacity
 - 2. Fabrication using bolted compression lugs for internal wiring
 - 3. Integral disconnect switch
 - 4. Redundant suppression circuits
 - 5. Redundant replaceable modules

6. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus
 7. Arrangement with wire connections to phase buses, neutral bus, and ground bus
 8. LED indicator lights for power and protection status
 9. Audible alarm, with silencing switch, to indicate when protection has failed.
 10. One set of dry contacts rated at 5A and 250 VAC, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
 11. Surge-event operations counter
- C. Peak Single-Impulse Surge Current Rating: 240 kA per phase
- D. Connection Means: Permanently wired
- E. Protection modes and UL 1449 SVR for grounded wye circuits with voltages of 480/277, 3-phase, 4-wire circuits shall be as follows:
1. Line to Neutral: 800V
 2. Line to Ground: 800V
 3. Neutral to Ground: 800V

2.3 PANELBOARD SUPPRESSORS

- A. Surge Protection Device Description: Non-modular, sine-wave-tracking type with the following features and accessories:
1. LED indicator lights for power and protection status.
 2. Audible alarm, with silencing switch, to indicate when protection has failed.
 3. One set of dry contacts rated at 5A and 250 VAC, for remote monitoring of protection status.
- B. Surge Protection Device Description: Modular design with field-replaceable modules, sign-wave-tracking type with the following features and accessories:
1. Fuses, rated at 200 kA interrupting capacity
 2. Fabrication using bolted compression lugs for internal wiring
 3. Integral disconnect switch
 4. Redundant suppression circuits
 5. Redundant replaceable modules
 6. Arrangement with wire connections to phase buses, neutral bus, and ground bus
 7. LED indicator lights for power and protection status
 8. Audible alarm, with silencing switch, to indicate when protection has failed
 9. One set of dry contacts rated at 5A and 250 VAC, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
 10. Surge-event operations counter
- C. Peak Single-Impulse Surge Current Rating: 120 kA per phase
- D. Protection modes and UL 1449 SVR for grounded wye circuits with voltages of 208Y/120, 3-phase, 4-wire circuits shall be as follows:

1. Line to Neutral: 400V
 2. Line to Ground: 400V
 3. Neutral to Ground: 400V
- E. Protection modes and UL 1449 SVR for 240/120V, single-phase, 3-wire circuits shall be as follows:
1. Line to Neutral: 400V
 2. Line to Ground: 400V
 3. Neutral to Ground: 400V
- F. Protection modes and UL 1449 SVR for 240/120V, 3-phase, 4-wire circuits with high leg shall be as follows:
1. Line to Neutral: 400V, 800V from high leg
 2. Line to Ground: 400V
 3. Neutral to Ground: 400V

2.4 ENCLOSURES

- A. NEMA 250, with type matching the enclosure of panel or device being protected.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

- A. Install devices at service entrance on load side, with ground lead bonded to service entrance ground.
- B. Install devices for panelboard, Motor Control Center, and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
1. Provide multi-pole, 30A circuit breaker as a dedicated disconnect for suppressor, unless otherwise indicated.

3.2 PLACING SYSTEM INTO SERVICE

- A. Do not energize or connect panelboards, Motor Control Centers to their sources until surge protection devices are installed and connected.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test and adjust equipment installation, including connections, and to assist in field testing. Furnish all test results.
1. Verify that electrical wiring installation complies with manufacturer's written installation requirements.

- B. Testing: Perform the following field tests and inspections and prepare test reports:
 - 1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements
 - 2. Complete startup checks according to manufacturer's written instructions.
 - 3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
- C. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transient voltage suppression devices. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION 264313

SECTION 310000 - EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. The Work covered by this Section shall include all excavation, trenching and related work for the construction of the designated structures and pipelines, backfill and other incidental work.
- B. The Work covered by this Section consists of:
 - 1. making all necessary excavations for the construction of all Work;
 - 2. preparing subgrade for foundations, slabs, walks, and pavements;
 - 3. doing all pumping, fluming, and dewatering necessary to keep the trenches and other excavation free from water;
 - 4. providing for uninterrupted flow of existing drains and sewers, and the disposal of water from any sources during the progress of the Work;
 - 5. supporting and protecting all trench walls, structures, pipes, conduits, culverts, posts, poles, wires, fences, buildings and other public and private property adjacent to the Work;
 - 6. removing and replacing existing sewers, culverts, pipelines and bulkheads where necessary;
 - 7. removing after completion of the Work all sheeting and shoring or other soil support materials not necessary to support the sides of trenches;
 - 8. removing and disposing all surplus excavated material;
 - 9. doing all backfilling and grading, of compacting backfill to limits specified or ordered by the Engineer;
 - 10. restoring all property damaged as a result of the Work involved in this Contract.
- C. The Work includes transporting surplus excavated materials not needed for backfill at the location where the excavation is made, to other parts of the Work where filling is required, and disposal of all types of surplus material off the site.
- D. The Work
 - 1. constructing a structure of soil or granular material in layers to a predetermined elevation and cross section;
 - 2. supporting and protecting all structures, pipes, conduits, culverts, posts, poles, wires, fences, buildings and other public and private property adjacent to the Work;
 - 3. placing all fill and performing rough grading;
 - 4. compacting fill to limits specified or ordered by the Engineer;
 - 5. restoring all property damaged as a result of the Work involved in this Contract.

1.2 DEFINITIONS

- A. Backfill: Soil or granular materials used to fill an excavation.
 - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, not including haunches to support sides of pipe.
 - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Bedding: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Borrow: Satisfactory soil imported for use as fill or backfill.
- D. Excavation: Removal and disposal of material encountered above subgrade or foundation elevations.
 - 1. Additional Excavation: Excavation below subgrade or foundation elevations as directed by Engineer.
 - 2. Trench: Narrow linear excavation
 - 3. Unauthorized Excavation: Excavation below subgrade or foundation elevations or beyond indicated dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.
 - 4. Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface or subsurface conditions encountered, including rock, soil materials and obstructions.
- E. Embankment: A structure consisting of soil, granular material, shale, rock, or other approved material, constructed in layers to a predetermined elevation and cross-section.
- F. Granular materials: Natural aggregate, such as broken or crushed rock, gravel, or sand that can be readily incorporated into an 8-inch layer, and in which at least 65% by weight of the grains or particles are retained in a No. 200 sieve.
- G. Laboratory Dry Weight: The maximum laboratory dry weight shall be the weight provided by the laboratory when the sample is tested in accordance with ASTM D-698 Method A, C, or D.
- H. Optimum Moisture: The water content at which the maximum density is produced in a soil by a given compaction effort (ASTM D-698).
- I. Pavement Prism: Also referred to as the zone of influence. The area below a line drawn 45 degrees to the horizontal from the surface at the edge of pavement, sidewalk or curb.
- J. Pipe Embedment: The material placed in a trench surrounding a pipe or conduit consisting of the foundation, bedding, haunching, and initial backfill.

- K. Rock: Rock material in beds, ledges, unstratified masses, and conglomerate deposits and boulders of rock material one (1) cu. yd. or more in volume that when tested by an independent geotechnical testing agency, according to ASTM D 1586, exceeds a standard penetration resistance of 100 blows/2 inches.
- L. Shale: Laminated material, formed by the consolidation in nature of soil, having a finely stratified structure. For the purpose of these specifications, the following bedrock types shall also be considered shale: mudstone, claystone, siltstone and hard clay.
- M. Soil: All earth materials, organic or inorganic, which have resulted from natural processes such as weathering, decay, and chemical reaction.
- N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, pavement, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- O. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage course, or topsoil materials.
- P. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

- A. Comply with all provisions of Section 013300, Shop Drawings and Submittals.
- B. Product Data: For the following:
 - 1. Source-locations of all materials shall be identified to the Engineer.
 - 2. Source quality laboratory test of all fill materials as required to show compliance with material specifications.
- C. Shop Drawings: Submit information for the following items:
 - 1. Sheeting and bracing prepared and stamped by a professional engineer, registered in the State of Ohio.
 - 2. Dewatering system and standby equipment prepared and stamped by a professional engineer, registered in the State of Ohio.
 - 3. Excavation procedures.

1.4 REFERENCES

- A. AASHTO M 43 Standard Specification for Size of Aggregate for Road and Bridge Construction

- B. ASTM C-150 Standard Specification for Portland Cement
- C. ASTM C-618 Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- D. ASTM D-698 Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop
- E. ASTM D-1586 Standard Method for Penetration Test and Split-Barrel Sampling of Soils
- F. ASTM D-2487 Standard Test Method for Classification of Soils for Engineering Purposes
- G. ASTM D-2940 Standard Specification for Graded Aggregate Material for Bases or Subbases for Highways or Airports
- H. ASTM D-4253 Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
- I. ASTM D-4254 Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
- J. State of Ohio - Department of Transportation - Construction and Material Specifications, Item 304, Aggregate Base.
- K. State of Ohio - Department of Transportation - Construction and Material Specifications, Material Detail 703.16, Suitable Materials for Embankment Construction.
- L. State of Ohio - Department of Transportation - Construction and Material Specifications, Material Detail 703.02.A.2, Fine Aggregate for Portland Cement Concrete

1.5 QUALITY ASSURANCE

- A. Qualifications - Work shall be performed by personal meeting requirements identified in section 014323 – Qualifications of Tradesmen.
- B. Regulatory Requirements – Contractor shall follow all local, state, and federal requirements for disposal of excess materials and use of materials for backfill for the proposed work.
- C. Certifications – The Contractor shall provide certification that all materials meet requirements identified in plans, specifications, and bid/contract documents.
- D. Field Samples – All pipe and manhole testing shall be in accordance with testing requirements detailed within this section and section 013319 – Field Testing Requirements.

- E. Mock-ups – Contractor is required to submit plans for utility and excavation support systems as well as a dewatering system where necessary that shall be approved by the Engineer prior to installation of such systems commencing. All plans shall be stamped and submitted by a Professional Engineer registered in the State of Ohio.

1.6 PROJECT CONDITIONS

A. Existing Conditions

- 1. Existing ground elevations of the site are shown by figures and/or by contours on the Drawings. The contours and elevations of the present ground are believed to be reasonably correct, but do not purport to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy himself, however, by actual examination on the site of the Work, as to the existing elevations and contours, and the amount of work required.

B. Existing Utilities

- 1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
- 2. Notify Engineer not less than two days in advance of proposed utility interruptions.
- 3. Do not proceed with utility interruptions without Engineer's written permission.
- 4. Contact utility-locator service for area where Project is located before excavating.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the site, store and protect under provisions of Section 016600, Product Handling and Protection.
- B. Comply with all provisions of Section 013543, Environmental Protection.

1.8 PROHIBITION OF EXPLOSIVES

- A. The use of explosives is not permitted.

1.9 FIELD MEASUREMENTS

- A. The Contract Drawings may indicate locations where certain utilities, structures or facilities might possibly interfere with the installation of new improvements. The Contractor shall dig such exploratory test pits as may be necessary to determine the exact location and elevation of the indicated subsurface structure and shall make acceptable provision for their protection, support and maintenance in operation. The

Engineer shall be provided advance notification when and where excavation for test pits will take place. The Contractor shall provide the Engineer a record of field locations of all listed utilities, structures or facilities a minimum of five (5) days prior to initiating construction of the project. Locations and elevations are to be provided by a Surveyor registered in the State of Ohio.

PART 2 - PRODUCTS

2.1 GRANULAR PIPE EMBEDMENT

- A. Crushed gravel or crushed limestone meeting AASHTO M 43 gradation shall be used for bedding, haunching, and initial backfill as shown on the Drawings.

2.2 SAND PIPE EMBEDMENT

- A. Fine aggregate consisting of natural sand meeting the gradation requirements of ODOT Item 703.02.A.2 or shown on the Drawings. The material shall not be lumpy or frozen, and shall be free from slag, cinders, ashes, rubbish, and other deleterious or objectionable material. Sand shall not contain a total of more than 10% by weight of loam and clay.

2.3 ONSITE BACKFILL

- A. Excavated soil material, capable of meeting specified compaction, and approved by the Engineer for use as backfill in designated locations.
- B. Based upon subsurface investigation, the Owner does not guarantee the onsite soils in its present state consists of the proper moisture content to achieve the specified compaction without drying or adding water.
- C. Unsuitable Backfill Material
 - 1. Onsite materials that are unsuitable for backfill, unless otherwise specifically shown in the Drawings, include rock or other materials greater than six (6) inches in their largest dimension, pavement, rubbish, debris, wood, metal, plastic, frozen earth, and the following soils classified per ASTM D-2487:

Symbol	Description
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity
PT	Peat, muck, and other highly organic soils

2.4 SPECIAL BACKFILL MATERIAL (ODOT Item 304)

- A. Special backfill material shall meet the gradation requirements of ODOT Item 304 and shall consist of crushed gravel or crushed limestone in combination with natural sand or stone. The aggregate shall meet the following gradation requirements:

<u>Sieve</u>	<u>Total Percent Passing</u>
2 inch	100
1 inch	70-100
¾ inch	50-90
No. 4	30-60
No. 30	9-33
No. 200	0-15

2.5 LOW STRENGTH MORTAR BACKFILL

- A. Low Strength Mortar shall comply with ODOT Item 613.
- B. Submit test data that demonstrates that the proposed mix has a strength of 50 to 100 PSI at 28 days.
- C. Each load shall be tested with 3 cylinders for strength test broken at 3, 7, and 28 days until the Engineer is assured that the mix will be between 50 to 100 PSI at 28 days. Thereafter, one set of strength tests shall be taken every 50 CY.

It is intended that the sand be fine enough to stay in suspension in the mixture to the extent required for proper flow. The Engineer reserves the right to reject the sand if a flowable mixture cannot be produced.

- D. Mortar Mix Proportioning

1. The initial trial mixture shall be as follows:

Quantity of Dry Materials per Cubic Yard

Cement	100 lbs.
Fly Ash	250 lbs.
Sand (SSD)*	2700 lbs.
Water	500 lbs.

* saturated-surface dry

2. These quantities of materials are expected to yield approximately 1 cubic yard of mortar of the proper consistency. Adjustments of the proportions may be made providing the total absolute volume of the materials is maintained.

2.6 ENGINEERED FILL

- A. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940. The aggregate shall meet the following gradation requirements:

<u>Sieve</u>	<u>Total Percent Passing</u>
2 inch	100
1½ inch	95-100
¾ inch	70-92
3/8 inch	50-70
No. 4	35-55
No. 30	12-25
No. 200	0-8

PART 3 - EXECUTION

3.1 PROTECTION

- A. Excavation; Temporary Sheet piling, Shoring, and Bracing

1. All excavation shall be in accordance with the Occupation Safety and Health Administration (OSHA) regulations.
2. The Contractor shall furnish and install adequate sheet piling, shoring, and bracing to maintain safe working conditions, and to protect newly built work and all adjacent neighboring structures from damage by settlement.
3. Bracing shall be arranged so as not to place a strain on portions of completed work until construction has proceeded enough to provide ample strength. Sheet piling and bracing may be withdrawn and removed at the time of backfilling, but the Contractor shall be responsible for all damage to newly built work and adjacent and neighboring structures.
4. All sheet piling shall be removed unless specifically authorized in writing by the Engineer to be left in place.

- B. Construction Sheet piling Left in Place

1. The Contractor shall furnish, install, and leave in place construction sheet piling and bracing when specified or when indicated or shown on the Drawings.
2. Any construction sheet piling and bracing which the Contractor has placed to facilitate his work may be ordered in writing by the Engineer to be left in place. The right of the Engineer to order sheet piling and bracing left in place shall not be construed as creating an obligation on his part to issue such orders. Failure of the Engineer to order sheet piling and bracing left in place shall not relieve the Contractor of his responsibility under this Contract.

- C. Construction Sheet piling Left in Place

1. The Contractor shall furnish, install, and leave in place construction sheeting and bracing when specified or when indicated or shown on the Drawings.
2. Any construction sheeting and bracing which the Contractor has placed to facilitate his work may be ordered in writing by the Engineer to be left in place. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating an obligation on his part to issue such orders. Failure of the Engineer to order sheeting and bracing left in place shall not relieve the Contractor of his responsibility under this Contract.

3.2 REPLACING, MOVING AND REPAIRING OF EXISTING UTILITIES

A. The Contractor shall:

1. replace, move, repair and maintain all utilities and all other structures encountered in the work
2. coordinate and communicate with applicable utility companies
3. repair all damage done to any of the said structures and appurtenances through his acts or neglect and shall keep them in repair during the life of this contract. The Contractor shall in all cases leave them in as good condition as they were previous to the commencement of the work and to the satisfaction of the Engineer.

3.3 EXCAVATION CLASSIFICATION

A. All excavated materials are unclassified as defined in Article 1.3.

3.4 GENERAL EXCAVATION

- A. All necessary excavation for buildings, structures, pavements, and site improvements shall be performed to accommodate the completion of all related Contract Work.
- B. The Drawings show the horizontal and the lower limits of structures. The methods and equipment used by the Contractor when approaching the bottom limits of excavation shall be selected to provide a smooth surface and to prevent disturbing the soil below the bottom limits of excavation. All soil loosened during excavation shall be removed from the bottom of the excavation.
- C. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
- D. Excavation which is carried below the bottom limits of structures shall be classified as Unauthorized Excavation, unless said excavation below bottom limits of structures has been authorized by the Engineer prior to each occurrence.

3.5 TRENCH EXCAVATION

- A. Excavation for trenches in which pipelines, sewers, and conduits are to be installed shall provide adequate space for workmen to space and joint pipe properly, but in every case the trench shall be kept to a minimum width. The width of trench shall not exceed the limits shown on the Drawings.
- B. Excavation shall be to the depth necessary for placing of granular bedding material under the pipe as shown on the Drawings. If over-excavation occurs, the trench bottom shall be filled to grade with compacted granular bedding material.
- C. Trenching operations shall not be performed beyond the distance that will be backfilled and compacted the same day.
- D. In general, backfilling shall begin as soon as the conduit is in approved condition to receive it and shall be carried to completion as rapidly as possible. New trenching shall not be started when earlier trenches need backfilling or the surfaces of streets or other areas need to be restored to a safe and proper condition.

3.6 EXCAVATION OF UNSUITABLE MATERIALS

- A. Unsuitable materials existing below the Contract bottom limits for excavation shall be removed as directed by the Engineer. Such excavation shall not exceed the vertical and lateral limits as prescribed by the Engineer.
- B. In utility trenches, the voids left by removal of unsuitable excavated material shall be filled with AASHTO M 43 No. 1 and No. 2 aggregate conforming to the material requirements of Article 2.1 of this Section.
- C. In excavations other than utility trenches, the voids left by removal of unsuitable excavated material shall be filled with material consisting of either: (1) Special Backfill Material; (2) Class B concrete; or (3) Low Strength Mortar Backfill, whichever is ordered by the Engineer.
- D. Removal of unsuitable excavated material and its replacement as directed will be paid on basis of Contract Conditions relative to Changes in Work unless specific unit prices have been established for excavation of unsuitable material.

3.7 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

- A. It shall be the responsibility of the Contractor to dispose of all surplus material that cannot be used in backfill or embankments at his expense outside the limits of the project. Unsuitable excavated material, including rock or large boulders, shall be disposed of outside the limits of the project.
- B. Surplus material may be wasted adjacent to or incorporated in the regular construction only when ordered in writing by the Engineer.

3.8 BACKFILL

A. Pipelines, Sewers and Conduits

1. All pipe shall have bedding extending the width of the trench with depth in conformance with the Drawings. The bedding material shall be thoroughly compacted by tamping until no further densification is possible.
2. Pipe cover material shall be used for filling above the pipe bedding along the sides of the pipe and to a height of twelve (12) inches over the top of the pipe. The pipe cover material shall be brought up evenly on both sides of the pipe to eliminate the possibility of lateral displacement of the pipe and shall be thoroughly compacted by tamping until no further densification is possible. Care shall be taken to spade the aggregate under the pipe haunch below the spring line.
3. All trenches and excavations shall be backfilled immediately after pipe is laid therein, unless otherwise directed by the Engineer.
4. After the pipe cover has been placed and compacted around the pipe as specified above, the remainder of the trench may be backfilled by machine. The backfill material shall be deposited in eight (8) inch horizontal layers, and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. In no case will backfilling material from a bucket be allowed to fall directly on a pipe and in all cases the bucket must be lowered so that the shock of the falling earth will not cause damage.

B. Structures

1. Backfilling shall not commence before concrete has attained specified strength. Do not use equipment for backfilling and compaction operations against structures that will overload the structure.
2. Backfilling around and over structures shall be carefully placed and tamped with tools of suitable weight to a point one (1) foot above the top of same. Additional backfill may be required to protect the structure from damage from heavy equipment. Backfill shall be placed in uniform layers not exceeding eight (8) inches in depth. Each layer shall be placed, then carefully and uniformly compacted to the specified density so as to eliminate the possibility of displacement of the structure.
3. After the backfill has been placed and compacted around the structure to the height specified above, the remainder may be backfilled by machine. The backfill material shall be deposited in eight (8) inch horizontal layers, and each layer shall be thoroughly compacted to the specified density by approved methods before a succeeding layer is placed. In no case will backfilling material from a bucket be allowed to fall directly on a structure, and in all cases the bucket must be lowered so that the shock of the falling earth will not cause damage.

- C. Where any new, proposed, or future pavement, driveway, parking lot, curb, curb and gutter, or walk is to be placed over a backfilled area, Special Backfill material shall be used for any portion of the trench falling within the pavement prism.

- D. Where it is necessary to undercut or replace existing utility conduits and/or service lines, the excavation beneath such lines shall be backfilled the entire length with approved Granular Pipe Embedment Material compacted in place in eight (8) inch layers to the required density. The approved Granular Pipe Embedment Material shall extend outward from the spring line of the conduit a distance of two (2) feet on either side and thence downward at its natural slope.

3.9 LOW STRENGTH MORTAR BACKFILL

- A. Low strength mortar backfill shall be discharged from the mixer as recommended by the supplier and approved by the Engineer.
- B. Low strength mortar backfill may be placed in the trench in as few lifts as may be practical.
- C. Secure conduit or pipelines before placing low strength mortar backfill to prevent conduits and pipelines from floating during backfilling.
- D. For low strength mortar backfill placed against existing structures of unknown strength, backfill material shall be brought up uniformly in maximum 12 inch lifts and allowed to cure for a minimum of 24 hours or until it can carry a person's weight without leaving imprints before the next lift is placed.
- E. Low strength mortar backfill shall be brought up to subgrade elevation or the pavement prism, whichever may be applicable.

3.10 SUBGRADE

- A. All soil subgrade shall be prepared in accordance with this subsection.
- B. Drainage
 - 1. The surface of the subgrade shall be maintained in a smooth condition to prevent ponding of water after rains to insure the thorough drainage of the subgrade surface at all times.
- C. Unsuitable Subgrade
 - 1. Where unsuitable subgrade or subgrade not meeting the required bearing capacity is encountered in cuts, due to no fault or neglect of the Contractor, in which satisfactory stability cannot be obtained by moisture control and compaction, the unstable material shall be excavated to the depth required by the Engineer.
 - 2. Suitable material required for the embankment to replace the undercut will be paid on basis of Contract Conditions relative to changes in Work.
 - 3. Where soft subgrade in cuts is due to the failure of the Contractor to maintain adequate surface drainage as required in this article, or is due to any other

fault or neglect of the Contractor, the unstable condition shall be corrected as outlined above at no expense to the Owner.

D. Full Width New Pavement Construction

1. After the surface of the subgrade has been shaped to approximate cross section grade, and before any pavement, base or subbase material is placed thereon, the subgrade shall be compacted. When the rolling is completed, all surface irregularities shall be corrected and the surface of the subgrade shall be shaped as necessary to conform to the grade and cross section shown on the Drawings within the tolerance set forth in this Section and shall be so maintained until the overlying course is in place.

3.11 TOLERANCES

- A. The Contractor shall check the work under this item with templates, slope boards or other devices satisfactory to the Engineer. The completed work shall conform to the Drawings within the following tolerances:
 1. For subgrade, the surface shall at no place vary more than $\frac{1}{2}$ inch from a ten-foot straight edge applied to the surface parallel to the centerline of the pavement, nor more than $\frac{1}{2}$ inch from subgrade elevation established by construction layout stakes.

3.12 CONSTRUCTION WITH MOISTURE AND DENSITY CONTROL

- A. All backfill shall be constructed using moisture and density control. All subgrade, except rock and shale in cut sections, shall be constructed using moisture and density control.
- B. Backfill subgrade material which does not contain sufficient moisture to be compacted in accordance with the requirements of Article 3.17 of this Section shall be sprinkled with water as directed by the Engineer to bring the moisture content to within the range of optimum plus or minus three (3) percent. Water shall be thoroughly incorporated into the material by means of discs or other approved equipment.
- C. Backfill and subgrade material containing excess moisture shall be dried, prior to installation, to a moisture content not greater than three (3) percentage points above optimum, except that for material within the moisture content range specified herein that displays pronounced elasticity or deformation under the action of loaded construction equipment, the moisture content shall be reduced to optimum or below if necessary to secure stability. For subgrade material, these requirements for maximum moisture shall apply at the time of compaction of the subgrade and also at the time of placing pavement or subbase. Drying of wet soil shall be expedited by the use of plows, discs, or by other approved methods when so ordered by the Engineer.

3.13 COMPACTION REQUIREMENTS

- A. The bottom of excavations upon which concrete foundations or structures are to be placed shall be compacted so as to obtain 100% of maximum dry density per ASTM D-698 in the top twelve (12) inches.
- B. The top twelve (12) inches of stripped original subgrade and final subgrade shall be compacted to not less than 100% of maximum dry density per ASTM D-698.
 - 1. Subgrade under new, proposed, or future pavement shall be compacted 18 inches beyond the edge of pavement, paved shoulders or paved medians.
- C. Compaction of subgrade for sidewalks (regardless of paving material) shall be 100% of maximum dry density per ASTM D-698 in the top six (6) inches.
- D. Compaction of non-paved areas shall be 90% of maximum dry density per ASTM D-698.
- E. Aggregate pipe embedment and aggregate backfill around structures shall be compacted to not less than 100% of maximum dry density per ASTM D-4253 and ASTM D-4254.
- F. Final backfill shall be compacted to not less than 100% of maximum dry density per ASTM D-698.
- G. Fill placed within the interior of structures shall be compacted to not less than 100% of maximum dry density per ASTM D-698.
- H. Embankment shall be placed and compacted in layers until the density is not less than the percentage of maximum dry density indicated in the following table determined by ASTM D-698.

3.14 GRADING

- A. 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.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading
 - 1. Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - a. Lawn or unpaved areas shall be graded to plus or minus *1 inch*

b. Walks shall be graded to plus or minus *0.5 inch*.

C. Grading inside Building Lines

1. Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

END OF SECTION 310000

SECTION 311000 - SITE CLEARING

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 the following:
 - 1. Protecting existing trees, shrubbery, and vegetation to remain.
 - 2. Removing trees and other vegetation.
 - 3. Clearing and grubbing.
 - 4. Topsoil stripping.
- B. Related Sections include the following:
 - 1. Division 32 - Section "Seeding" for finish grading, including placing and preparing topsoil for lawns and planting.
- C. Restrictions that apply to tree clearing:
 - 1. No clearing of trees shall take place between April 1st and September 15th.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

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

1.5 SUBMITTALS

- A. Prior to beginning any work on the project, the Contractor shall provide two (2) sets of photographs that depict the condition of existing landscape items on the developed

properties within the project. These photographs shall be in addition to the pre-construction documentation that is specified under Section 013236.

1.6 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 authorities having jurisdiction.
- B. Improvements on Private Property: Authority for performing indicated removal and alteration work on private property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Extent of work on private property is indicated on the drawings.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store within project limits where indicated.
- D. Notify Ohio Utilities Protection Service before site clearing.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, walkways and streets.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation as necessary and approved for installation of new construction. Removal includes digging out stumps

and obstructions and grubbing roots.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 3. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
 4. Tree stump located in residential lawned areas are to be ground with a stump grinder.
 5. Use only hand methods for grubbing within drip line of remaining trees.
- 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 8-inch (200-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

3.3 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
 2. Do not stockpile topsoil within drip line of remaining trees.
 3. Dispose of excess topsoil as specified for waste material disposal.
 4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.4 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off site.
- B. Burning: Burning is not permitted.

END OF SECTION 311000

SECTION 312000 - DEWATERING

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 construction dewatering.

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control ground-water flow into excavations and permit construction to proceed on dry, stable subgrades.
 - 1. Maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Accomplish dewatering without damaging existing buildings, trees to remain, parking lots, and other structures adjacent to excavation.
 - 4. Obtain required regulatory approvals and permits for the dewatering operations.
 - 5. Sequence and coordinate work of this Section with any excavation, filling, grading, utility installation and pavement construction so that all work can be completed without conflicts and in accordance with applicable Specifications.
 - 6. Remove dewatering system if no longer needed.

1.4 SUBMITTALS

- A. Shop Drawings for Information: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of headers and discharge lines; and means of discharge and disposal of water.
 - 1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
 - 2. Include a written report outlining control procedures to be adopted if dewatering problems arise.
 - 3. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Qualification Data: For Installer and professional engineer.

- C. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.
- D. Record drawings at Project closeout identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions performed during dewatering.
 - 1. Note locations and capping depth of wells and well points.
- E. Field Test Reports: Before starting excavation, submit test results and computations demonstrating that dewatering system is capable of meeting performance requirements.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with water disposal requirements of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Engineer and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Project-Site Information: Subsurface investigations have been performed at the site by the Owner. The logs from these investigations are available for review by the Contractor.
 - 1. The Owner makes no predictions or representations regarding the character or extent of soil, groundwater, or other subsurface or environmental conditions to be encountered during the work. Conditions are not intended as representations or warranties of accuracy or continuity between investigations. The Contractor shall make his own deductions of the subsurface or environmental conditions which may affect the methods or cost of construction of the work hereunder, and he agrees that he will make no claims for damages or compensations, except as are provided under the agreement, should he find conditions during the progress of the work different from those as calculated and/or anticipated by him. Additional borings and other exploratory operations may be performed by Contractor, at the Contractor's option and following the Owner's approval. No change in the Contract Sum will be authorized for such additional exploration undertaken by the Contractor.
 - 2. The Contractor, by careful examination, shall inform himself as to the nature and location of the work; the conformation of the ground; the nature of the subsurface and environmental conditions; the location of the groundwater table; the character, quality and quantity of the materials to be encountered; conditions of the neighboring / bordering structures and utilities; the character of the equipment and facilities needed preliminary to and during the execution of the work; and all other matters which can in any way affect the work.

3. The Contractor shall be held to have visited the site and to have familiarized himself with the existing conditions of the site, neighboring / bordering buildings, properties, and utilities. The Contractor shall be held to have familiarized himself with the existing conditions of the site which include but are not limited to the following:
 - a. Proximity of the site, temporary excavation support system, and building foundation to the neighboring structures.
 - b. Construction debris at the site.
 - c. Conditions of the neighboring structures within close proximity to the site.
- C. The Contractor shall investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation to, and ingress and egress of the site. The Contractor shall conform to all City and State, and Federal regulations in regard to the transportation of materials to and from and at the job site and shall secure in advance such permits as may be required.

1.7 PROTECTION

A. Bordering Structures:

1. Prior to commencement of any work, the Contractor shall consult the records for the existing neighboring/bordering structures and note all conditions and limitations which might affect the work required under this Section.
2. The Contractor shall protect fences, structures, sidewalks, paving, curbs, etc. to remain from equipment and vehicular traffic.
3. In performing the work of this specification, the Contractor shall take care so as not to affect the stability and integrity of the existing neighboring / bordering buildings and existing utilities, which may also induce settlements in them.

B. Existing Utilities:

1. Locate existing underground utilities in and beyond the areas of work. If utilities are indicated to remain in place, provide adequate means of support and protection during the work.
 - a. Should uncharted, or incorrectly charted, piping or other utilities be encountered during dewatering operations, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - b. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by the Construction Manager and then only after acceptable temporary utility services have been provided. Provide minimum of 48 hour notice to the Construction Manager, and receive written notice to proceed before interrupting any utility.

- C. The responsibility for any damage to the neighboring / bordering buildings, structures, utilities, sidewalks, pavement, and other facilities in the vicinity resulting from the Contractor's operations will be entirely his, and he shall take whatever measures are necessary to prevent the same.
- D. Monuments, bench marks, monitoring points, and other reference features on streets bounding this project shall be protected. Should these be disturbed in any manner, they shall be reset by the Contractor's Professional Land Surveyor to the satisfaction of the respective Owner, at the Contractor's expense.
- E. Provide barricades, warning lights, and barriers to prevent accidents, to avoid all necessary hazards, and protect the public, the work, and property at all times, including Saturdays, Sundays, and Holidays.
- F. Examine drawings to determine sequence of operations, and relation to work of other trades. Start of work will signify acceptance of field conditions and will acknowledge coordination with other trades.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Dewatering equipment in accordance with Contractor's submitted and reviewed dewatering Submittal.
- B. Treatment equipment shall be used as needed so that the pumped water meets effluent quality standards applicable to the discharge/disposal method selected.

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 dewatering operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

3.2 INSTALLATION

- A. 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.
- B. The methods of dewatering shall be at the option of the Contractor, provided that dewatering is accomplished in a manner that will not cause instability of the excavation sides, will not result in loss of ground from beyond the property lines, and will not cause settlement or damage to existing neighboring / bordering structures, streets, pavements, and utilities.
- C. 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.
- D. 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.
- E. 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.
- F. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction. Disposal and quality of dewatering water to surface waters or MS4 structures must follow the Ohio EPA Permit No. OH0000006.
- G. The dewatering system shall be installed and operated in such a manner as to avoid the movement of fines or loss of ground support and loss of support from below the bearing level for existing utilities and structures and shall not compromise the stability of surrounding areas and structures to remain
- 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. Dispose of all sediments, sludges, and other wastes generated by any treatment systems in accordance with Federal, State, and Local requirements.
- I. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 312000

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

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 temporary excavation support and protection systems.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.4 DEFINITIONS

- A. Lagging: A temporary or permanent excavation support structure consisting of heavy timber boards, planking, sheathing, or reinforced precast concrete planks secured in place by steel H-piles.
- B. Proof Load: An applied load 25 percent greater than the design load, imposed by load test.
- C. Sheeting: A line of timber or planks, plain or tongue-and-grooved on sides, driven end-wise into the ground to protect sub grade operations.
- D. Sheet Piling: Interlocking steel sheet piling installed vertically to hold back earth or retain soil and to keep water out of a foundation excavation. May be a temporary or permanent structure.
- E. Shores/Shoring: Props or posts of timber or other material in compression, used for temporary support of excavations.
- F. Slide Rail Shoring System: Slide-Rail Systems are modular, high-capacity shoring systems that are typically used in areas of poor soil conditions exist. Double-walled steel panels slide into tracked rails as earth is excavated allowing for minimal soil movement

or loss of support. Slide rail systems are predominantly used in areas where loose sandy or structurally unstable soil exist. Full depth trench support is maintained during excavation and backfill operations by means of placing or removing individual panels as the depth of trench changes.

- G. Soldier Piles: Vertical steel H-piles installed to take the side thrust. Also called soldier beams.
- H. Strut: A brace or supporting member which resists thrusts in the direction of its own length; may be vertical, diagonal, or horizontal.
- I. Waler: A horizontal beam used to brace or support vertical sheeting or sheet piling.

1.5 DESIGN CRITERIA

- A. Design excavation support systems to support earth pressures, utility loads, equipment, applicable traffic and construction loads, and other surcharge loads in a manner which will allow the safe and expeditious construction of permanent structures without movement or settlement of the ground and in a manner which will prevent settlement of and damage to, or movement of, adjacent buildings, structures, utilities, or other facilities during the various stages of construction. Include evaluation of the effects of dewatering and flooding of excavation.
- B. Design each component to support the maximum loads which may occur during various stages of construction. Include lateral pressure due to earthquake. For the purpose of this Section, the design load means the maximum load the support member will have to carry in actual practice, and the proof load means a specified test load greater than the design load.
- C. Support of excavation structures shall be analyzed for all conditions which may occur during the various stages of construction. Among others, these conditions include: installation, relocation and removal of struts; flooding and dewatering of excavations; and concreting of excavation bottom. The loading conditions on opposite sides of a cut may not be equal. In this case, both sides shall be designed for and be compatible with the larger loading. The conditions to which the design applies shall be indicated on the Shop Drawings.
- D. Carry the bottom of support system to a depth below the main excavation as adequate to prevent lateral and vertical movement. Where additional excavation is carried below the main excavation, provide means to prevent movement of the main excavation supports.
- E. Design the excavation support system to allow the required free excavated space for workers, concrete formwork, wall waterproofing, and drainage systems.
- F. Design excavation support systems for staged installation and removal to conform to construction and backfill sequences as indicated. Leave excavation support systems in place, except as specified otherwise herein or in the Contract Specifications.

- G. Employ walers and struts for horizontal support as required for excavation faces to be retained by sheet piles. Provide struts with intermediate vertical and horizontal supports as required to prevent buckling. Struts shall be preloaded by wedging or jacking to 50 percent of the design load.
- H. Provide diagonal bracing where needed for stability of the system.

1.6 SUBMITTALS

- A. Shop Drawings and calculations: Submit Shop Drawings and supporting calculations for excavation support systems.
- B. Pre-construction Surveys: Submit pre-construction surveys as specified in Article 1.7A herein.
- C. Movement Detection Procedures: Submit procedures for detection of movement as specified in Article 3.1 herein.
- D. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.
 - 1. Include Shop Drawings signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For Installer and professional engineer.
- F. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.7 SITE CONDITIONS

- A. Pre-construction Surveys: The Contractor shall submit to the Engineer, for review and approval, pre-construction surveys for existing structures and facilities located above or adjacent to the new construction and which may be affected by the work. These surveys shall include photographs, maps, plans, written descriptions, and surveyed foundation levels as necessary to fully document pre-construction conditions.
- B. Provision for Contingencies:
 - 1. Monitor performance of components of excavation support systems, both for vertical and horizontal movement, at regular intervals. Provide strut-monitoring devices, installed in accordance with the manufacturer's instructions, at locations indicated or required.
 - 2. Provide and secure approval for a contingency plan, or alternative procedures, to be implemented in the event of an unfavorable performance of the system.
 - 3. Have materials and equipment available to implement the approved contingency plan.

C. Existing Utilities:

1. Proceed with caution in areas of utility facilities and structures. Expose existing utilities by hand-excavation or by other methods acceptable to the utility owner.
2. If existing utility facilities and structures interfere with proposed method of excavation support, modify or relocate such facilities in accordance with the utility owner's recommendations.

D. Loads:

1. Lateral loads shall not be transferred to new concrete structures by removal of excavation support systems until the new structure has attained its 28-day compressive strength, or except as otherwise indicated.

1.8 PROJECT CONDITIONS

- A. Delete paragraph below if no existing utilities. Coordinate with requirements specified in Division 1 Section "Temporary Facilities and Controls" for temporary utilities.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
- C. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
 1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
 2. The geotechnical report is included elsewhere in the Project Manual.
- D. Survey adjacent structures and improvements, employing a qualified professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Architect if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.

- B. Structural Steel: ASTM A 36/A 36M.
- C. Steel Sheet Piling: ASTM A 328/A 328M with continuous interlocks.
- D. Slide Rail Systems: Pre-engineered excavation support system as designed and supplied by Efficiency Production, Inc., United Rentals or approved equivalent.

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 that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.
- D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 INSTALLATION REQUIREMENTS

- A. Install excavation support systems for safety and preservation of existing improvements. Excavation support systems shall consist of structures designed by the Contractor to support the various excavations.
- B. Construct support systems in accordance with approved Shop Drawings and in a manner that will ensure that supported faces will be stabilized. Provide for additional soil pressure caused by adjacent surcharge loads.
- C. No part of the excavation support systems that will remain permanently in place shall be placed or allowed to deflect within the limits of permanent structures.

- D. Piles and vertical members of excavation support systems shall be within 1.0 per-cent of plumb.
- E. Do not use combustible waste or similar material for packing or soil retention in excavations.

3.3 SHEET PILING

- A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.
- B. Drive or vibrate sheet piles in plumb position, with each pile interlocked with adjoining pile for its entire length so as to form a continuous diaphragm throughout the length of each run of wall.
- C. Provide driving method so that interlocking members can be extracted, if required, without injury to adjacent fills
- D. Do not drive piles within 100 feet of concrete less than seven days old.

3.4 INSTALLATION OF SLIDE RAIL SHORING SYSTEMS

- A. Most tieback systems are proprietary. Add material requirements to Part 2 if particular tieback is required. If tiebacks are permanent, consider level of corrosion protection of tendons and anchorage connections.
- B. Tiebacks: Drill for, install, grout, and tension tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
 - 1. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.
 - 2. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 DETECTION OF MOVEMENT

- A. For each existing structure or facility within a zone of influence extending upward from the bottom of the excavation on a slope of 2 horizontal to 1 vertical, install settlement detection devices on each footing, foundation, wall, or other feature to be monitored. Settlement detection devices shall be capable of being read to an accuracy of 0.005 foot.
- B. Take and record readings not less than once per week during performance of the work.
- C. Stop work; notify the Engineer, and take immediate remedial action if movement of the existing structure occurs during performance of the work. All construction activities shall be immediately halted when the settlement of any structure or facility reaches 0.3

inch, and shall not be resumed until after implementation of approved remedial measures.

- D. Upon completion of the work, take weekly readings of the measurement points for a period of 4 weeks, or longer if movement persists, and report the results to the Engineer.

3.6 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
 - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
 - 2. Repair or replace, as approved by Architect, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 315000

SECTION 320116.71 - PAVEMENT PLANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. This work shall consist of planing the existing pavement and disposing of the cuttings in accordance with these specifications in areas designated on the plans or established by the Engineer. When provided for in the contract, the work shall also consist of patching the planed surface.

1.3 JOB CONDITIONS

- A. Existing Pavement Type
 - 1. The item description indicates the predominate type of pavement. All pavement encountered in the areas designated on the plans shall be planed, measured, and paid for under the item unless a separate item is provided in the contract.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Planing equipment shall be self-propelled with sufficient power and stability to consistently and efficiently produce the required results. The cutting element may be made of the grinding, sawing, or milling type. Bituminous surfaces also may be planed using the blade type cutter of the heater planer, unless otherwise specified.
- B. Planing cutters shall be mounted rigidly to the carrier and shall be adjustable and controllable as to depth of cut and cross-slope.

Longitudinal planing action may be produced either by means of a suitable carrier wheelbase or by means of an automatic control system having an external reference. Cross-slope adjustments or automatic controls shall be capable of producing either a variable or a constant cross-slope as required.

- C. Planing cutters shall be designed, maintained and operated so as to produce a surface free from grooves, ridges, gouges or other irregularities detrimental to the safe operation of vehicles in traffic routed onto the planed surface, temporarily or permanently.

- D. When heaters are used, adequate provisions shall be made for the safety of persons in the vicinity of the equipment and for preventing damage to adjacent property and facilities, public or private.
- E. Suitable supplemental equipment or methods, approved by the Engineer, may be used in small or confined areas.

PART 3 - EXECUTION

3.1 PLANING

- A. One or more planing passes shall be made over the designated area as necessary to remove such irregularities as bumps, corrugations, and wheel ruts, and when required, as necessary to establish a new pavement surface elevation or cross-slope.
- B. Cuttings shall be removed from the surface following each pass of the equipment. Before opening the completed area to traffic, the surface shall be cleaned thoroughly of all loose material that would create a hazard, a nuisance, or would be redeposited into the surface texture.
- C. Effective measures shall be taken to control dust, smoke, contamination of the pavement, and the scattering of loose particles during planing and cleaning operations.
- D. Where sound pavement has been gouged, torn, or otherwise damaged during planing operations, the damaged area shall be repaired at no additional cost in a manner satisfactory to the Engineer to conform to the adjacent pavement in smoothness and durability.

3.2 SURFACE PATCHING

- A. Areas of the planed surface to be patched due to spalling or dislodgement of unsound pavement will be designated by the Engineer. The areas shall be cleaned of loose material, coated with ODOT 407.02 tack coat material, ODOT 702.02 or ODOT 702.04, and filled with asphalt concrete, ODOT 404, leveled and compacted to conform to the adjacent pavement.

3.3 SURFACE TOLERANCES

- A. When the contract provides for planing without resurfacing, the surface shall be planed to a smoothness of plus or minus 1/8 inch in 10 feet and the surfaces at the edges of adjacent passes shall be matched within plus or minus 1/8 inch. When the contract includes resurfacing, these tolerances shall be plus or minus 1/4 inch. The cross-slope of the planed surface shall conform to the specified cross-slope within plus or minus 3/8 inch in ten feet.

END OF SECTION 320116.71

SECTION 320190

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

A. DESCRIPTION

1. Related Requirements: Review the General Contract Conditions.
2. Work Included: Provide Landscape Maintenance, complete as specified.
 - a. Work in this Section includes, but is not limited to, furnishing all labor, materials, equipment and incidentals needed to provide a complete landscape and irrigation maintenance program to the Owner following the original one-year warranty from date of Substantial Completion.
 - b. Maintenance items shall include all items constructed under the original landscape contract including: Landscape maintenance shall include necessary watering, cultivation, weeding, pruning, wound dressing, disease and insect pest control, protective spraying, adjustments of plants mowing, replacement of mulch that has been displaced, repairing and reshaping of saucers, and reseeding or replanting of those areas affected. Remove rubbish, waste, tools, and equipment used at end of each workday.
 - c. Work specifically included for maintenance includes:
 - i. Watering, pruning, weed control, inspection and replacement of mulch for trees and groundcover beds.
 - ii. Fertilization, watering and weed control within the meadow areas.
 - iii. Irrigation system start-up and related adjustment, winter shut-down and controller programming.
 - iv. Inspection of irrigation system and repair of any damages.
 - v. Site inspection of potential insect, pest and disease problems and filing of monthly status report.
 - vi. Clean-up of trash, litter and debris.
3. Work which may be required under this Section, but which if required will be considered a claim for extra work upon approval from the Owner, include the following:
 - a. Insect, pest and disease control.
 - b. Plant replacement due to theft, vandalism, or accidental damage by others after one year warranty period.
 - c. Repair of damages to the irrigation system, which have not been caused by Contractor's maintenance practices or negligence.

B. QUALITY ASSURANCE

1. Requirements of Regulatory Agencies

- a. Perform all work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work.
- b. Provide for all inspections and permits required by Federal, State, or local authorities in furnishing, transporting, and installing of all agricultural chemicals.

2. Applicable Standards:

- a. Workmanship and overall maintenance program shall conform to the highest level of industry standards.
- b. The contractors and their workforce shall conform to the standards, regulations and requirements set forth by the Owner.

3. Work Force:

a. Experience:

- I. The site landscape maintenance firm shall have a full time foreman assigned to the job for the duration of the contract. He shall have a minimum of four years experience in landscape maintenance supervision, with experience or training in entomology, pest control, soils, fertilizers and plant identification.
- II. The meadow maintenance shall be performed by an Environmental Management Company with five years of successful meadow management experience. Acceptable companies are as follows:
 - 1) Ohio Prairie Nursery, 330-569-3380
 - 2) Davey Resource Group, 330-673-5685

- b. Labor Force: The landscape maintenance firm's labor force shall be thoroughly familiar and trained in the work to be accomplished and perform the task in a competent, efficient manner acceptable to the Owner.
- c. Supervision: The foreman shall directly employ and supervise the work force at all times. Notify Owner of all changes in supervision.
- d. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and labor force per the Owner's requirements.
- e. References:
 - I. For maintenance of sites with similar landscaping for a minimum of three (3) years.
 - II. For maintenance of successfully established meadows for a minimum of three (3) years.

C. SUBMITTALS

1. Submit three (3) copies each of the following items:

- a. Schedule of maintenance operations, including times of operation, and monthly status report including list of all equipment and materials proposed for the job.
- b. All licenses and insurance required by the local governing authority and the State of Ohio pertaining to this work.
- c. Monthly record of all herbicides, insecticides and disease control chemicals used for the project.

D. PROJECT CONDITIONS

1. Site Visit: At beginning of maintenance period, visit and walk the site with the Landscape Architect to clarify scope of work and understand existing project/site conditions.
2. Documentation of Conditions: Document general condition of existing trees, shrubs, vines, groundcovers and lawn recording all plant materials, which are damaged, or dying, if any, using video or photographic methods.
3. Irrigation System: Document general condition of existing irrigation system, making sure that faulty electrical controllers, broken or inoperable sprinkler heads or emitters are reported.

E. SCHEDULING

1. Perform all maintenance during hours mutually agreed upon between Owner and Contractor.
2. Work force shall be present at the project site at least once a week and as often as necessary to perform specified maintenance in accordance with the approved maintenance schedule.

PART 2 - PRODUCTS

A. ACCEPTABLE MANUFACTURERS

1. Fertilizers:

Sierra Chemical Company

W.R. Grace and Co.
Agricultural Chemicals Group

BFC Chemicals, Inc.

2. Herbicides:

Chevron Chemical Company

Rhone-Poulenc Chemical Company
Agro Chemical Division

Ciba-Geigy Corporation
Agricultural Division

Elanco Products Company

The DOW Chemical Company

3M Company-Agri Chemicals Project
3M Center, Bldg. 223-6SE

B. MATERIALS

1. General: All materials and equipment, unless otherwise indicated, shall be provided by the Contractor.
2. Water: Clean, potable and fresh, furnished on site by the Owner.
3. Fertilizers:
 - a. 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.
 - b. Fertilizer shall be phosphate free 12-12-12, uniform in composition, free flowing and suitable for application with approved equipment delivered to the site in bags or other convenient containers, each fully labeled, conforming to applicable state fertilizer laws, and bearing the name, trade name or trademark, and warranty of the producer.
 - c. Balanced, once-a-season application controlled-release fertilizers with a blend of coated prills which supply controlled-release nitrogen, phosphorus and potassium, and uncoated, rapidly soluble prills containing nitrogen and phosphorous.
4. Herbicides, Insecticides, and Fungicides:
 - a. Obtain best quality materials with original manufacturers' containers, properly labeled with guaranteed analysis.
 - b. Use non-staining materials.
 - c. Where available, contractor shall use biological and/or organic friendly chemicals when possible. Submit list to the Owner.
5. Seed: Match existing seed mixes on the site. Refer to planting plan for location of specific seed areas. Obtain needed seed mixes from seed supplier Ohio Prairie Nursery 330-569-3380.
 - a. Low Maintenance Lawn Mix: Freedom Lawn II Mix
 - b. Native grasses/wildflower meadow Mix: Custom Grass/Forb Meadow Mix #GFM01
 - c. Upland Meadow Mix: Mesic Short Grass Seed Mix
 - d. Stormwater Meadow basin slopes: Basin Side Slope Seed Mix
6. Wetland Plugs: Match existing wetland plug varieties. Wetland plugs as supplied by Ohio Prairie Nursery 330-569-3380.
7. Plant material: Refer to planting plan for specific tree, shrub and groundcover varieties.

8. Replacement Tree Guys, Stakes, Ties and Wires: Match existing materials on the site.
9. Mulch: All mulch shall be double shredded hardwood bark dark brown in color.

PART 3 - EXECUTION

A. GENERAL

1. Duration:
 - a. Continuously maintain each plant and each portion of landscape area after the first year warranty has expired, and the original landscape contractor has completed their scope of work and outstanding warranty items.
 - b. Maintain meadow areas until meadows have become established without undesirable plants and invasive plants and weeds.
2. Protection:
 - a. Protect all planting areas from damage of all kinds from beginning of work until Final Acceptance.
 - b. Maintenance includes temporary protection fences, barriers and signs as required for protection.
3. Replacements:
 - a. Immediately treat or replace all plants, which become damaged or injured as a result of site operations or negligence. Provide the Owner with list of plant materials requiring replacement and a cost of replacement for authorization prior to replacement.
 - b. Replacement plants shall be of acceptable size, condition, variety and shall match the original landscape plan specifications.
4. Watering:
 - a. Utilize the Owner's irrigation system for watering to the extent of the system limits. Failure of system does not relieve Contractor's responsibility of maintaining desired level of moisture necessary to maintain vigorous, healthy growth. Contractor is responsible for watering beyond limits of the irrigation system as necessary to maintain vigorous, healthy growth.
 - b. Apply water in quantities sufficient to penetrate soil to minimum depth of 8-inches in shrub beds and 6-inches in turf areas at rate that will prevent saturation of soil.
 - c. Supplemental is available on on-site with the approval of the Owner. Contractor shall furnish hose and other watering equipment as required for supplemental watering. If on-site water is not available, immediately notify the Owner. Coordinate supplemental watering times with the Owner.

5. Clean up: During course of maintenance, excess and waste materials shall be continuously and promptly removed to avoid disruption. Do not dispose of excess and waste materials on site.
6. Maintenance report and schedule of activities: Provide monthly schedules and reports to Owner detailing previous and subsequent planned maintenance activities. Utilize report form located at the end of this section. Include dated digital photographs as necessary with each monthly report showing full current clear views of entire landscaped and turf areas.
7. Site Access:
 - a. Maintenance operations shall be performed such that it does not interfere with access or operation of the facility.
 - b. Avoid interference with the use of, and passage to and from the building and parking. Notify the Owner at least two full working days prior to commencing work, which may cause interference.

B. TREES AND SHRUBS

1. Raised earth watering saucer:
 - a. Maintain all watering saucers around plants so that enough water can be applied to establish moisture through major root zones.
 - b. For supplemental hand watering of watering basins, use a water wand to break the water force. Do not permit crown roots to become exposed to air through dislodging of soil and mulch.
 - c. Maintain originally called for depth of mulch to reduce evaporation and frequency of watering.
2. Pruning:
 - a. Prune trees to select and develop permanent scaffold branches that are smaller in diameter than the trunk or branch to which they are attached, and which have vertical spacing of 18 in. to 48 in. in radial orientation so as not to overlay one another.
 - b. Prune trees to eliminate diseased or damaged growth, and narrow V-shaped branch forks that lack strength. Reduce toppling and wind damage by thinning out crowns.
 - c. Prune trees to maintain growth within space limitations, maintaining a natural appearance and balancing crown with roots.
 - d. Stripping of lower branches ("raising up") of young trees will not be permitted.
 - e. Retain lower branches in a "tipped back" or pinched condition to promote caliper trunk growth (tapered trunk). Do not cut back to fewer than six buds or leaves on such branches. Only cut lower branches flush with the trunk after the tree is able to stand erect without staking or other support.
 - f. Do primary pruning of deciduous trees during the dormant season. Do not permit any pruning of trees prone to excessive "bleeding" during growth season.
 - g. Prune damaged trees or those that constitute health or safety hazards at any time

of year as required.

- h. Make all cuts clean and close to the trunk, without cutting into the branch collar. "Stubbing" will not be permitted. Cut smaller branches flush with trunk or lateral branch. Make larger cuts (1 in. in diameter or larger) parallel to shoulder rings with the top edge of the cut at the trunk or lateral branch.
- i. Branches too heavy to handle shall be precut in three stages to prevent splitting or peeling of bark. Make the first two cuts 18 in. or more from the trunk to remove the branch. Make the third cut at the trunk to remove the resulting stub.
- j. Do not prune or clip shrubs into balled or boxed forms unless specifically called for by design.

3. Staking or Guying of Trees:

- a. Resetting: Reset any leaning or settled plants straightening plants which lean or sag, adjustments of plants which settle or are planted too low to proper grades or upright position.
- b. Provide additional tree staking only as needed to correct leaning trees.
- c. Inspect stakes and guys at least once a month to check for rubbing that causes bark wounds.
- d. Conform to the industry recommended procedures of staking and guying.

4. Mulching:

- a. All weeds shall be removed from shrub beds and trees prior to mulch being put down.
- b. Mulch shall not be placed directly against the trunk or stem of the plant material.
- c. Application of mulch shall be done in mid spring after the soil has warmed sufficiently for active root growth and the mulch shall be 'turned' in the early fall.

5. Disease and Pest Control

- a. Control of diseases and pests shall be insured by regular, thorough inspections by a certified Arborist and prompt treatment either by spraying, pruning, or removal and replacement of diseased or unhealthy plant material. Plants shall be inspected for scale from January through March. If scale is present, a dormant miscible spray shall be applied per manufacturer's directions. From April through October, all plants shall be checked monthly for insects and diseases and treated appropriately.

6. Maintenance of Existing Trees and Shrubs to Remain:

- a. General: Conform to all applicable paragraphs regarding pruning, watering, spraying and fertilizing of new plant materials as specified in this section.
- b. Be alert to symptoms of construction damage to root systems of existing trees and shrubs as evidenced by wilting, unseasonal or early flowering or loss of leaves, and insect or disease infestation due to declining vigor.
- c. Give notification in writing of all evidence of declining tree or shrub vigor immediately upon discerning the problem. Take appropriate interim measures to mitigate the severity of the problem as specified in this section.

- d. Perform site inspection of wooded areas adjacent to the building, walks or parking areas for downed, damaged and hazard trees after storm events. Prune or remove damaged plant material.
- e. Submit written proposal and cost estimate for the correction of all conditions before proceeding with permanent correction work.

7. Stormwater Basins:

- a. Contractor will perform limited maintenance including trash and debris removal only from stormwater conveyance systems including swales, ditches, channels, dry detention and wet detention (retention) basins except for within open water areas.
- b. Contractor shall not operate motorized equipment or perform maintenance activities including mowing, trimming, herbicide, pesticide or fertilizer applications within areas identified as stormwater conveyance or collection areas.
- c. Evaluate and report overall condition of wetland areas and plant material on the monthly maintenance report provided below.
- d. Determine applicable environmental laws and regulations regarding the use of chemicals adjacent to these areas and complying with all such applicable laws and regulations. Contractor shall not apply any chemicals directly or indirectly into stormwater conveyance or collection areas.

C. GROUNDCOVERS

1. Watering:

- a. Check for moisture penetration throughout the root zone at least twice a month.
- b. Water as frequently as necessary to maintain healthy growth of groundcover.

2. Weed Control:

- a. Weed Control: All planting beds shall be weed-free at all times.
- b. Weeding of all plants shall be done at a minimum of once a week from April through October. Seasonal weather changes may require additional weeding.
- c. All parking island planting beds plant shall be weed free.
- d. All meadow and naturalized planting areas shall be free of invasive and undesirable plants.
- e. Use only recommended and legally approved herbicides to control weed growth.
- f. Control weeds through proper cultural practices including cultivation, hand removal and hoeing, being careful to avoid damage to plant material.
- g. Proceed with the application of pre-emergent and selective systemic herbicides only at the approval of the Owner's Representative and recommendations from the environmental landscape management consultant.

3. Pruning:

- a. Prune groundcover as needed once or twice a season to provide a uniform bed height and to keep groundcover from extending beyond curb and pavement edges.
- b. Pruning: Limit pruning to removal of damaged or dead twigs and foliage.

- c. Prune groundcover twice a season to a height of 6" or as directed by the Owners landscape maintenance staff.
- d. Remove clippings from the groundcover beds and the site.

4. Mulching

- a. All weeds shall be removed from groundcover beds prior to mulch being put down.
- b. Application of mulch shall be done in mid spring after the soil has warmed sufficiently for active root growth and the mulch shall be 'turned' in the early fall.

D. MEADOWS

1. Weed Control:

- a. Weed control shall be applied by an Environmental landscape Management Company familiar with the meadow plantings.
- b. Non-wildflower areas: Apply broad leaf herbicide to all meadow grass areas without forbe species per the recommendations of the seed supplier. Make a visual inspection of all seeded areas to verify the presence and growth of broadleaf weeds and invasive plant materials prior to herbicide application.
- c. Wildflower areas: Remove weeds and invasive plant materials by hand pulling or by selective herbicide glove application. Reseed areas as disturbed by weed removal with the same seed mix. Tamp seed mix in place.

2. Mowing: The Meadows and Low Maintenance Lawn Mix are not intended to be mowed manicured lawns. Refer to planting plan for specific areas of the Low Maintenance Lawn Mix. The Low Maintenance Lawn Mix may be mowed per the following guidelines:

- a. The Freedom Lawn II seed mix shall be mowed to maintain a six 6 to eight 8 inch height, and shall not be mowed shorter than four (4) inches.
- b. Mow all native seed areas one (1) time per year to a height of six (6") in late fall (November) or once seed heads have dried or prior to spring growing season.
- c. Paper, trash, leaves and other debris shall be picked up prior to mowing and removed from the premises. Do not dispose of on site.
- d. Cutting pattern shall be varied as frequently as will permit, but the same pattern shall not be used more frequently than every fourth (4) mowing.
- e. Premises shall be left free of grass clippings in groundcover beds, on sidewalks, driveways, parking lots, etc.
- f. Excessive accumulations of grass clippings shall be picked up after each mowing, and acceptable amounts of clippings shall be left to decompose into thatch layer, contributing nutrients to turfgrass.
- g. Concrete areas shall be edged so that grass is not growing over the sides. The edging shall not provide any gap between concrete and lawn, which could pose a safety hazard.

3. Right of Way Mowing: The right of way area along Darrow Road is intended to be mowed to the limits defined by the Owner, and must comply with any City standards.

E. INSECTS, PESTS, AND DISEASE CONTROL

1. Inspection: Inspect all plant materials for signs of stress, damage and potential trouble from the following:
 - a. Presence of insects, moles, gophers, ground squirrels, snails and slugs in planting areas.
 - b. Discolored or blotching leaves or needles.
 - c. Unusually light green or yellowish green color inconsistent with normal green color of leaves.
 - d. Personnel: Perform spraying for insect, pest and disease control only by licensed, qualified, trained personnel.
 - e. Application: Spray with extreme care to avoid all hazards to any person, building, parking and walking areas in the area or adjacent areas.

F. FERTILIZING

- a. New trees and shrub plantings shall be fertilized once yearly during early spring with 12-12-12 (or equal) fertilizer by means of tree/shrub spikes applied at the appropriate rate based on the size of the plant material.
- b. Existing trees shall be deep root fertilized as needed based on an Arborist recommendation.

G. IRRIGATION SYSTEM

1. General:
 - a. Repair without charge to Owner all damages to system caused by Contractor's operations. Perform all repairs within one (1) watering period.
 - b. Report promptly to Owner all accidental damage not resulting from Contractor's negligence or operations.
 - c. Set and program automatic controllers for seasonal water requirements.
 - d. Twice a month, use a probe or other acceptable tool to check the rootball moisture of representative plants as well as the surrounding soil.
2. Cleaning and Monitoring the System:
 - a. Continually monitor the irrigation systems to verify that they are functioning properly as designed. Make program adjustments required by changing field conditions.
 - b. Clean pump filter and strainer once a year and as often as necessary to keep the irrigation systems free of sand and other debris.
 - c. Prevent spraying on windows, walks, building walls, and site structures by balancing the throttle control on the remote control valves and the adjustment screws on the sprinkler heads. Do not allow water to atomize and drift.
3. Winterization: The irrigation system is designed to be completely drained to protect pipe from bursting prior to freezing temperatures. To adequately drain the system,

the following procedure must be followed:

- a. Air blow-out
- b. Set automatic control stations to 2-1/2 minutes timing.
- c. Attach hose from portable air compressor to 1 in. air inlet installed on main line at backflow preventer.
- d. Operate compressor at 100 cu. ft. per second at 60-80 PSI.
- e. Manual drain valves: Open manual drain valves located at low points on the main line to drain main completely after air blow-out has been completed.
- f. Backflow Preventer: Rotate backflow unit at unions and open pet cocks and drain. Reverse operation and tighten unions to resume irrigation.

H. FALL CLEAN-UP

1. Leaves shall be picked up from all lawn areas, pavement, walks, and planting bed areas by the end of the autumn season. An additional "pick-up" in late November shall be included in areas as needed due to trees such as oaks that hold their leaves longer.

I. SPRING CLEAN-UP

1. Leaves and debris shall be cleaned from all lawn and planting beds prior to first mowing, if applicable.
2. Remove of all litter and debris, which detracts from the overall appearance of the property.

J. MISCELLANEOUS

1. Preliminary Review: As soon as all plantings are completed per Contract Documents, hold a preliminary review to determine the condition of the work.
2. Date of Review: Submit a written request at least five (5) working days prior to anticipated date of review.

K. THE ONE (1) YEAR MAINTENANCE PERIOD

1. The following items shall be done one year after installation, if appropriate, at an additional cost to the owner.
 - a. It is the responsibility of the installation contractor to notify the Owner or Owner's representative that guys and stakes should be removed (1) year after installation. If not removed, maintenance contractor will remove at an additional expense.
 - b. All dead or unhealthy plant material out of warranty shall be replaced upon the approval of plant selection and price by the owner.

L. NO-FAULT REPAIR AND CORRECTION:

1. No fault repair and correction work shall consist of work to correct faults or repair damage existing through no fault of the Contractor, but which is necessary for the continued proper maintenance and operation of the landscaping including correction of sprinkler system, on-site utilities, equipment, landscape plants, materials damage, or other corrections necessary for the duration of the Maintenance Contract. No fault repair and correction shall not include work as otherwise defined within the scope of

Maintenance. The Contractor shall provide a cost to perform such necessary work to the Owner for approval prior to completing the work.

M. SNOW PLOWING

1. The contractor responsible for snow plowing shall refer to snow plowing exhibit with designated areas for snow stacking as dictated by the OEPA. Snow stacking shall only occur within parking field and shall not extend beyond limits of parking lot curbing.

PART 4 - LANDSCAPE MAINTENANCE CHECKLIST GUIDE

MARCH

- Inspect for dead or damaged plant material.
- Minor winter maintenance depending on weather conditions.
- Prune trees and summer flowering shrubs if required.
- Apply dormant oil sprays if necessary
- Apply herbicides, pre-emergent weed spray if necessary.
- Perform soil test from planting beds and meadow areas to determine any spring fertilizer requirements.

APRIL

- Inspect for dead or damaged plant material.
- Prune spring flowering shrubs before new growth begins or after blooming season.
- Fertilize trees and shrubs.
- Fertilize meadows.
- Trim ground cover beds and fertilize.
- Weed planting beds.
- Weed meadows if needed.
- Apply mulch to trees.
- Edge planting beds and sidewalks, if applicable.
- Apply herbicides, pre-emergent weed sprays.
- Apply pre-emergent insecticide if applicable.
- Replace salt damaged turf areas

MAY

- Insecticide preventative spray for trees, meadows and shrubs if applicable.
- Fertilize meadows.
- Weed planting beds weekly.
- Mow low maintenance lawn mix if applicable.
- Edge planting beds and sidewalks if applicable.

JUNE

- Prune spring flowering shrubs after blooming.
- Weed planting beds weekly.
- Fertilize trees and shrubs.
- Inspect plants and lawns for diseases.
- Apply insecticides only as needed.
- Prune hedges, as required.
- Edge planting beds and sidewalks if applicable
- Monitor soil moisture weekly.

JULY

- Weed planting beds weekly.
- Inspect plants and lawns for diseases.
- Apply insecticides only as needed.
- Monitor soil moisture weekly.

AUGUST

- Weed plant beds weekly.
- Edge planting beds and sidewalks if applicable
- Apply insecticides only as needed.
- Inspect plants and meadows for diseases.
- Monitor soil moisture weekly.

SEPTEMBER

- Weed plant beds weekly.
- Mow and trim lawns.
- Weed lawns.
- Edge planting beds and sidewalks if applicable
- Inspect plants and lawn for diseases.

OCTOBER

- Prune hedges and trees.
- Weed plant beds as needed.
- Rake leaves as needed.
- Mow and trim lawns.
- Fertilize lawn.

NOVEMBER

- Inspect plants for injury, disease.
- Rake leaves as needed and general pickup.
- Apply dormant oil sprays if necessary.

DECEMBER

- If requested by the Owner, provide protection for plant material that will be exposed to salt over the winter.

MONTHLY MAINTENANCE REPORT AND SCHEDULE OF ACTIVITIES

Project Location: _____ Date: _____

(City)

(State)

Reporting Period (month/day/year – month/day/year):

Maintenance Activities Completed during this Reporting Period:

- Was lawn mowing performed? YES ___ NO ___
Performed _____ by:

(company)

(supervisor)

Date(s): _____

- Were trees pruned? YES ___ NO ___
Performed _____ by:

(company)

(supervisor)

Date(s): _____

- Were shrubs pruned? YES ___ NO ___
Performed _____ by:

(company)

(supervisor)

- Was supplemental watering performed? YES ___ NO ___

Trees YES ___ NO ___

Shrubs YES ___ NO ___

Lawn YES ___ NO ___

Performed by: _____

(company)

(supervisor)

Date(s): _____

- Were post / pre-emergent herbicides, insecticides, or fungicides applied? YES ___
NO ___
Performed _____ by:

(company)

(supervisor)

Date(s): _____

Types: _____

Rate of application: _____

- Was fertilizer applied to the meadows or low maintenance lawns? YES___NO___

Performed by: _____

(company)

(supervisor)

Date(s): _____

Types: _____

Rate of application: _____

- Was fertilizer applied to the trees or groundcover? YES___ NO___

Performed by: _____

(company)

(supervisor)

Date(s): _____

Types: _____

Rate of application: _____

- Were any plant materials adjusted or replaced? YES___NO___

Performed by: _____

(company)

(supervisor)

List species, location and date of each adjustment / replacement:

4. _____

5. _____

- Was mulch added to the trees or shrub planting area? YES___ NO___

Performed _____ by: _____

(company)

(supervisor)

Date(s): _____

Number of bags: _____

- Were repairs on the landscaping or irrigation system performed? YES _____

NO

Performed _____ by: _____

(company)

(supervisor)

List repairs, locations and dates:

4. _____

Week #2 (8th – 14th):

Week #3 (15th – 21st):

Week #4 (22nd – End of the Month):

Landscape/Maintenance Contractor: _____
(Signature) (Date)

(Print Name and Title)

CONTRACTOR WORK COMPLETION REPORT

(Form to be completed by the facility manager and submitted with the Monthly Maintenance Report and Schedule of Activities).

FACILITY MANAGER: Please initial on the appropriate blanks.

Yes

No

- Was quality of work satisfactory? _____
- Did the contractor's employees cooperate with you satisfactorily? _____
- Was clean up after work completion satisfactory? _____
- Did the contractor's employees complete all specified work? _____
- Did you personally inspect completed work? _____
- Overall performance: EXCELLENT GOOD POOR

Other Comments: _____

Managers

Signature: _____ DATE: _____

PRINT NAME AND

TITLE: _____

END OF SECTION

SECTION 320190.35 - RIGHT-OF-WAY TREE MAINTENANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

- A. To provide all labor, supervision, equipment, services, and expertise necessary to perform right-of-way tree maintenance work on specified trees in the public right-of-way as specified herein. Since this work is of a potentially dangerous nature and requires special expertise, it is to be performed by a Contractor (or Subcontractor to the Contractor) that derives a majority of its annual income from arboricultural work and whose employees are highly trained and skilled in all phases of tree service work. Contractor shall have at least five years of experience in performing this scope of work and provide a list and references for same.

The Contractor has the responsibility to:

1. Remove or prune designated trees.
2. Reserve work space along any public streets.
3. Grind out stump when tree is to be removed.
4. Remove excess material and clean-up site.
5. Guarantee that specifications are met.
6. Keep work site safe at all times.
7. Any work incidental to above.

1.3 DEFINITIONS

- A. Reference: Reference to any other specifications or standards means the latest revision in effect on date of invitation to bid. This set of specifications governs when disagreement with reference specifications occurs.
- B. Specified: Means specified in the invitation to bid.
- C. ANSI Z-133: American Standard of Tree Worker Safety.
- D. ANSI A300: Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance.
- E. Contractor: A company that earns the majority of its annual revenue from pruning and maintaining trees. Contractor must employ an ISA Certified Arborist and/or Certified Tree Worker, who is on the job site at all times. Certifications shall be submitted with the bid.

1.4 WORK PROCEDURES

- A. Equipment: All bidders must have in their possession or available to them by formal agreement at the time of bidding: trucks, devices, chippers, hand tools, aerial and other equipment, and supplies which are necessary to perform the work as outlined in these specifications. The Owner and/or Engineer may inspect such equipment or agreements prior to the awarding of a contract.
- B. Tree Location: The Work shall be limited to trees located in the Owner's public right-of-way, permanent easements and temporary construction easements. All work under this contract shall be assigned by the Owner and/or Engineer by marking the trees with blue paint for priority pruning or red paint if tree is to be removed. The Owner reserves the right to change, add, or delete areas or quantities to be pruned or removed as it deems to be in its best interest. The Contractor shall be responsible for notifying the appropriate utility authority before removing trees growing in the utility wires or grinding stumps. Contractor shall be responsible for any damage to utilities during the removal or pruning process.
- C. Supervision: Contractor shall consult with the Owner and/or Engineer concerning details of scheduling of all work. Contractor shall have a competent person in charge of his work at all times to whom the Owner and/or Engineer may issue directives who shall accept and act upon such directives. Failure for the supervisor to act on said directives shall be sufficient cause to give notice that the Contractor is in default of contract unless such directives would create potential personal injury or safety hazards. The Contractor shall have an ISA Certified Arborist or Certified Tree Worker on the job site at all times.
- D. Inspections: The Owner and/or Engineer shall inspect the work at its discretion. Immediate correction of any work not done to industry standards as noted by the Owner and/or Engineer will be communicated to the Contractor and will be performed by the Contractor at no additional expense to the Owner.
- E. Tree Damage: Climbing irons, spurs, or spikes are not to be used on trees to be pruned. Any tree damage caused by the Contractor shall be repaired immediately at no additional expense to the satisfaction of the Owner. Trees damaged beyond repair, as judged by the Owner, shall be removed at no expense to the Owner and replaced by a tree of size and species designated by the Owner or the dollar value of such damaged trees, as determined by the Owner, is deducted from the monies owed the contractor.
- F. Traffic Control: The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall provide the necessary warning devices, barricades, and personnel needed to give safety, protection, and warning to persons and vehicular traffic within and approaching the work area.
- G. Utility Agencies: Utility(s) shall be contacted by the contractor any time assistance is needed to work safely around overhead or underground installations. Tree trimming, tree removal and grinding operations may be conducted in areas where overhead or underground electric, telephone, data, cable television, gas, sanitary sewer, storm sewer or waterline facilities exist. The contractor shall protect all utilities from damage, shall immediately contact the appropriate utility if damage should occur and shall be responsible for all claims for damage due to his operations.

The contractor shall make arrangements with the utility for removal of all necessary limbs, branches or stumps that may conflict with or create a personal injury hazard in conducting the operations of this contract.

- H. Safety: The Work shall conform to the latest revision of American National Standards Institute Standard Z-133.1 (Safety Requirement for Pruning, Trimming, Repairing, Maintaining, Removing Trees, and for Cutting Brush).
- I. Clean Up: Clean-up procedures shall be completed within two hours after debris has been placed around the site of each tree requiring pruning or removal. The work site shall be left equal to or cleaner than pre-work conditions. It shall be the responsibility of the Contractor to remove and dispose in a proper and acceptable manner all logs, brush, bark, and other organic debris resulting from the tree maintenance operations. Wood may be left for residents at the residents' request. It is the Contractor's responsibility to obtain written authorization from the resident to leave wood on private property. Copies of the authorization shall be provided to the Owner.
- J. Damages: Damages by the Contractor to any person or property, public or private, are the total responsibility of the Contractor and shall be repaired or compensated for by the Contractor to the satisfaction of both the injured party and the Owner at no cost to the Owner.

PART 2 - EXECUTION

2.1 WORK SPECIFICATIONS AND PROCEDURES

- A. Pruning Specifications: Pruning shall conform to the latest revision of ANSI A300. Generally, all pruning shall be performed to allow for development or maintenance of the vegetation's natural growth habit. All cuts shall be made as close as possible to the trunk or parent limb, without cutting into the branch collar or leaving a protruding stub. Stub cutting is only permitted with permission of the Owner on damaged trees where pruning as described above would remove an inordinate amount of wood from the tree. Bark at the edge of all pruning cuts should remain firmly attached. All branches too large to support with one hand shall be precut to avoid splitting or tearing of the bark. Where necessary, ropes or other equipment shall be used to lower large branches or stubs to the ground.
 - 1. Trees fronting each side of the right of way shall be trimmed or removed unless otherwise specified. Dead trees beyond the right of way which would fall onto the roadway shall be removed. Leaning trees beyond the Right of Way, which would fall onto the roadway in falling the tree and which would require trimming if not removed, shall either be removed or trimmed, except that shade, fruit or ornamental trees shall be trimmed and not removed, unless otherwise authorized. If outside the Right of Way, the Owner will obtain a temporary construction easement from the property owner.
 - 2. If, while pruning a tree, a problem which suggests that the tree should be removed is discovered, Contractor shall notify the Engineer of the problem and wait for the Owner's and/or Engineer's decision before resuming work on the tree.
 - 3. Tree wound dressing shall not be used.

4. Equipment that will damage the bark and cambium layer should not be used on or in the trees. Sharp tools shall be used so that clean cuts will be made at all times.
 5. All cut limbs shall be removed from the crown upon completion of the pruning.
- B. Removal Specifications: Removals shall include topping and other operations necessary to safely remove the assigned trees. No trees or trunks shall be felled onto pavement. Work includes removal of basal sprout and brush and weeds within 3 feet of trunk. The tree stump shall be ground out to a depth of 6 inches below the normal surface level including all surface roots. Immediately after grinding each stump, the grindings must be removed from the work area. Adjacent sidewalks, lawns, driveways, streets, and ditches shall be cleaned. The cavity shall be cleaned and free from all grinding debris. The cavity shall be backfilled with clean, screened topsoil to normal ground level, seeded and mulched.
- C. Chemicals and sprays for vegetation control shall not be permitted.
- D. Clean-up and disposal of logs, branches or any other debris resulting from all operations shall be promptly and properly accomplished. The work area shall be kept safe at all times until the clean-up operation is completed.

END OF SECTION 320190.35

SECTION 321000- PAVEMENT REPLACEMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. The Contractor shall furnish all of the equipment, labor and materials necessary to install, replace, and/or restore existing pavement structures together with their respective appurtenances as shown on the plans and as specified herein. This work shall include all of the subgrade preparation, subbase, base, intermediate pavement course(s), and finish pavement courses together with curbing, guttering, tack and/or prime coating, sealing and other pertinent work as necessary to meet the conditions of this contract.

1.2 QUALITY ASSURANCE

- A. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.3 REPAIR OR REPLACEMENT WORK

- A. For the repair and/or replacement of all existing pavement structures and their respective appurtenances that are removed and destroyed or otherwise damaged by the Contractor in the course of his performance of the work required under this contract, the Contractor shall furnish all equipment, labor, and materials as necessary to properly restore to a condition equal to that at his entry, and to the satisfaction of the Engineer, the Ohio Department of Transportation, the County Engineer, City Engineer, gravel, water-bound macadam, bituminous macadam, asphalt and brick or concrete driveways, curbs, sidewalks and roadways in strict accordance with the drawings and as specified herein.
- B. In general, this item will include concrete, steel reinforcement, brick, stone, gravel, asphalt and other bituminous materials and curbs, gutters, driveway culverts, road and curb drains and the demolition, excavation and removal of existing driveways, sidewalks and roadways.

1.4 REFERENCE TO OTHER PARTS

- A. Other sections of these specifications shall apply, as and where applicable to this section and such sections will be the same as though they were included in this section.
- B. For all old work where pavement is being repaired and/or replaced as a result of damages occurring thereto during the course of the work of this contract, all clearing and grubbing, removal and storage of topsoil, excavation and/or placing of compacted fill and granular backfill, shall be done as required under other parts of these specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Generally, for all repair and replacement work, all new materials shall match the existing and adjoining work in both composition and quality unless otherwise ordered, specified herein, and/or shown on the drawings. In any stone driveway or roadway, the material used for stone fill shall conform to the existing material.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- A. All pavement work shall be done in strict accordance with the specifications of the governmental body concerned and the latest ODOT specifications as applicable or at the direction of the Engineer.
- B. All pavements disturbed by the Contractor's operations shall be relaid to the thickness of the adjoining pavement and, in all cases, the restoring of pavements, shall apply both to foundation courses and to the wearing surface.
- C. Should cracks or settlements appear in adjoining pavements, the paving shall be removed to the extent necessary to secure firm and undisturbed bearing and shall be replaced in a satisfactory manner.
- D. No permanent pavement shall be installed, repaired, and/or restored unless, or until, in the opinion of the Engineer, the condition of the backfill is such as to properly support the pavement.
- E. Where new or replacement concrete pavement or base is placed adjacent to existing concrete pavement or base, contraction joints shall be provided in the new or replacement pavement so as to form a continuous joint with that in the existing pavement.

3.2 ROADWAY SUBGRADE

- A. The entire area to be occupied by the roadways and parking areas shall be cleared, topsoil removed and stored, and the excavation or compacted fill made as required and brought to the proper cross-sections. Pipe trenches and other excavations shall be backfilled as required, and thoroughly compacted within the limits of the roadways or parking areas.
- B. After the surface of the subgrade has been properly shaped and before any stone or slag is placed, the entire subgrade shall be thoroughly rolled and compacted to a depth of 12 inches under this section. Rolling shall be done with an approved type of self-propelled roller, weighing not less than ten (10) tons. All hollows and depressions which develop during the rolling shall be filled with acceptable materials, and the subgrade rerolled. The process of filling and rolling shall be repeated until no depressions develop, and the entire subgrade has been brought to a uniform condition of stability.
- C. All places which, in the opinion of the Engineer cannot be properly rolled, shall be tamped with handheld mechanically or pneumatically powered tampers.
- D. In making the compacted fill and in doing the final subgrade rolling, the Contractor shall see that the material to be compacted and/or rolled has the proper moisture content to

secure maximum compaction. When, in the opinion of the Engineer, the material is too wet, the compacting shall be delayed until the material has dried sufficiently. When, in the opinion of the Engineer, the material is too dry, the material shall be sprinkled with water in an amount to secure the proper moisture content.

END OF SECTION 321000

SECTION 321216 - ASPHALT CONCRETE PAVING AND MATERIALS

PART 1 – GENERAL

1.1 MATERIALS

- A. The asphalt concrete mixture and installation thereof shall meet Ohio Department of Transportation (ODOT) Specifications except as modified in these specifications.
- B. In the ODOT Specifications substitute "Engineer" for "Department" (except as stated below in reference to ODOT 403 for Department VA testing and acceptance).
- C. No steel slag shall be used as coarse or fine aggregate for any asphalt concrete.
- D. All asphalt cement utilized on this project shall meet AASHTO Provisional Standard MP1 or any superseding AASHTO specification for performance graded asphalt cement binder in conformance with PG 64-22.
- E. Except where designated otherwise in the plans or specifications all asphalt concrete mixes shall be designed for medium traffic volumes. Where light or heavy traffic pavements are designated in the plan, the contractor shall use an asphalt concrete mix designed for such traffic conditions.
- F. Acceptance of the mixture will be based upon the certification that the mixture was produced according to the approved JMF within the production control and composition tolerances of the specifications. The Contractor shall hire and pay for an independent testing lab approved by the Engineer to perform all sampling, testing, monitoring, analysis and certification required by the Laboratory, Monitoring Team or Department in ODOT 403 and 441. All work by the independent laboratory shall be performed by personnel with ODOT Level II Bituminous Concrete certification.
- G. ODOT 401.20 - "Asphalt Binder Price Adjustment" shall not apply to this contract.
- H. Monument box and valve box risers shall be East Jordan Iron Works No. 8626, No. 8631, or approved equal. The Contractor shall follow the manufacturer's recommended installation procedure. New manhole frames and grate or frame and cover shall be EJIW 1710.
- I. Brick used for manhole, catch basin, or inlet basin castings adjusted to grade under ODOT 611.10 Method D.1. shall be red shale or clay sewer brick meeting the requirements of ASTM C32 sewer brick, grade SM.
- J. Risers used for manhole castings adjusted to grade under ODOT 611.10 Method D.2. shall be manufactured by Manhole Systems, Model MS-101TB, or approved equal.

- K. All inlets and manholes shall be adjusted to grade after installation of the intermediate course(s), if any and prior to installation of the surface course.
- L. All materials delivered to this project must have been weighed on a platform scale with electronic imprinter to show gross, tare, and net weights. No payment will be made for materials which are not correctly weighed as necessary. Material weight shall not exceed the current legal allowable limit.
- M. Unless specified elsewhere in the specifications, material for berms shall be limestone only. Recycled concrete and asphalt concrete will not be permitted.

PART 2 – PRODUCTS

2.1 PAVING EQUIPMENT

- A. All spreading equipment shall be self propelled. The Contractor shall identify the make and model of the paving machine that will be used for the intermediate and surface courses for approval prior to the pre-construction meeting.
- B. All equipment, tools, and machines used in the performance of this work shall be maintained in satisfactory working order at all times. The Contractor shall be prepared to furnish proof of certification that all equipment to be used on the project has been calibrated within the past six (6) months.

PART 3 – EXECUTION

3.1 GENERAL - PAVING

- A. All paving shall be done on a single-lane basis.
- B. If traffic loop detectors are encountered and broken, the Contractor is to repair as per local specifications. The cost for this work will be paid under the loop detector replacement bid item, if any; at negotiated unit prices; or by time and materials as directed by the Engineer.
- C. Tack Coat, Item 407, shall be applied at the rate of from 0.05 to 0.15 gallons per square yard as appropriate for the surface conditions with sand cover if required.
- D. Asphalt driveway aprons shall be matched to new pavement with 24" transition sections or as shown on the drawings or required by the Engineer. The Contractor shall install apron wedge as required in the detailed drawings.
- E. Unless otherwise shown on the drawings, jointing of new to existing pavement shall be by milled butt joints six (6) feet in width (or as shown on the plans) from edge of

pavement to edge of pavement. Depth of this milled area shall equal the total of subsequent intermediate course and surface course as specified.

- F. One (1) copy of each hauled/weighed material truck load ticket (plant ticket) for materials incorporated in this project shall be provided to the project representative daily. All bulk materials delivered to this project must have been weighed on a platform scale with electronic imprinter to show gross, tar and net weights. No payment will be made for materials which are not correctly weighed as necessary. Material weight shall not exceed the current legal allowable limit. If a partial load is used, the Contractor's foreman and the project representative shall confer and come to an agreement as to what portion of the product was used. The percent of material of this load, as reported by the project representative, is what shall be recorded as utilized.
- G. For variable depth courses where tonnage tickets are used for determining quantities for payment, the conversion to cubic yards shall be number of tons verified and approved by the Engineer divided by 2.00 regardless of the actual density of the mix.
- H. Positive drainage is to exist subsequent to the completion of the surface course. The Contractor shall take any necessary measures to assure positive drainage of the surface course. It shall be the responsibility of the Contractor to repair any low/puddled areas at his own cost by milling out the affected areas to a minimum depth equal to the nominal depth of the course being repaired and replacing with the specified asphalt concrete to grades that will correct the drainage problem.
- I. Surface tolerances for all completed surface courses shall be as noted in ODOT 401.19. This tolerance shall apply regardless of whether or not an intermediate course is installed.
- L. At the direction of the Engineer, periodic weight checks of asphalt concrete in loaded trucks shall be made by the Contractor and verified by the Engineer.
- M. All quality control testing data performed on material incorporated into this project shall be forwarded to the Engineer for review as soon as it is available.
- N. Quantity verification (but not necessarily payment quantity) for all asphalt concrete incorporated into the work shall be by weight tickets as produced by the plant or supplier or other means approved by the Engineer. Tack coat shall be verified by a ticket filled out and signed by the Contractor's tack truck driver based on weights taken or observations of level indicators. All verification tickets are required to be submitted to the Engineer on the day the material is incorporated into the work; however, the Engineer may, at his sole discretion, accept verification tickets for any items up to seven (7) calendar days subsequent to the work being performed. **After that date additional verification tickets for material will not be accepted for consideration of payment.**

- O. No work is to be performed without the presence of the Engineer or his designated Project Representative. Forty-eight (48) hour advance notice of work shall be given to the Engineer and Owner by the Contractor.
- P. All edges of surface courses abutting curbs or other appurtenances shall be sealed with hot AC-20.
- Q. The asphalt concrete, intermediate or surface course work will conform to ODOT Items 448-1 – Intermediate and Surfaces Courses and 448-2 – Intermediate Course. The paving foreman, at the Engineer's request, will be required to correctly calculate the asphalt concrete "yield." "Yield" is defined as the rate of material used, in cubic yards, in proportion to the area paved. The Contractor must be aware if he is under or over plan quantities for the area in question.

END OF SECTION 321216

SECTION 321613.13 - CONCRETE CURBS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Under this section the Contractor shall furnish and construct curbing of various, designated types as shown or scheduled on the Drawings.
- B. This section includes preparation of the base and/or subgrade construction of curbs, other work and materials incidental to the construction of curbing.

1.3 OWNER'S STANDARDS AND SPECIFICATIONS

- A. Items preceded by ODOT shall refer to the latest edition of the State of Ohio, Department of Transportation, Construction and Material Specifications.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. All concrete used shall be Class C as specified in Section 030000.

2.2 CURBING

- A. Other materials for curbing shall meet the applicable requirements of ODOT Item 609.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All soil subgrade under curbs shall be compacted in accordance with Section 310000.
- B. All construction for curbing shall be in accordance with ODOT Item 609 for the type called for on the Drawings.

END OF SECTION 321613.13

SECTION 321623 - CONCRETE WALKS AND STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Under this section the Contractor shall furnish and construct sidewalks and stairs as shown or scheduled on the Drawings, specified or directed.
- B. This section includes preparation of the base and/or subgrade construction of walks, adjustment of manhole castings and valve boxes to conform to new elevations and other work and materials incidental to the construction of walks and stairs.

1.3 OWNER'S STANDARDS AND SPECIFICATIONS

- A. Items preceded by ODOT shall refer to the latest edition of the State of Ohio, Department of Transportation, Construction and Material Specifications.

PART 2 - PRODUCTS

2.1 CONCRETE

- A. All concrete used shall be Class QC 1 as specified in section 030000.

2.2 WALKS AND STAIRS

- A. Other materials for walks and stairs shall meet the applicable requirements of ODOT Item 608.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All soil subgrade under walks and stairs shall be compacted in accordance with Division 31.
- B. All service boxes, manholes and inlet tops shall be set to the required grades.
- C. All construction for walks and stairs shall be in accordance with ODOT Item 608 for the type called for on the Drawings.

- D. Minimum thickness of concrete walks shall be 4 inches.
- E. Stairs shall be as detailed on the drawings.

END OF SECTION 321623

SECTION 329200.19 – SEEDING AND MULCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Installation of seeded areas shall be to the extent shown on Contract Drawings and shall include supplying all seed, topsoil, soil conditioning materials, mulching materials and watering, and the incorporation of these materials into the work as specified.
- B. The Contractor shall place topsoil at the depths specified in those areas requiring seeding. Topsoil shall be furnished by the Contractor.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Provide copies of soils tests for both new topsoil (provided) and onsite topsoil for review and approval. This applies to all areas that require seeding, including reconditioned areas.
 - 2. Provide location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown in the past 2 years.
 - 3. Provide the name of the seed supplier, name and phone number, list of the seed, including varieties of seed, labels, and an analysis of the seed for review, 4 weeks prior to the start of seeding.
 - 4. Provide soil amendments information based on soils test requirements.
 - 5. Hydroseed mixture, mulch and application rates prior to performing the work.

1.3 QUALITY ASSURANCE

- A. Any subcontracted restoration work shall be performed by a qualified firm specializing in landscape work.
- B. The Contractor shall have a soils test done at his expense and analyzed by a state approved testing agency. Soil tests shall be done on both the topsoil stockpiled from the site and new topsoil brought to the site. A minimum of two (2) tests shall be done. The tests shall include percent organic matter, pH, Buffer pH, Phosphorus, Exchangeable Potassium, Calcium, Magnesium, Cation Exchange Capacity and Percent Base Saturation with recommendations for nitrogen, phosphate, potash, magnesium and lime based on plant type and use.
- C. Seed: All seed specified shall meet O.D.O.T. specifications as to the percentage purity, weed seed, and germination. All seed shall be approved by the State of Ohio, Department

of Agriculture, Division of Plant Industry, and shall meet the requirements of these specifications.

- D. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

1.4 PROJECT CONDITIONS

- A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, such conditions shall be rectified by the Contractor before planting, with approval from the Owner's Representative.
- C. Soil Stabilization: The Contractor shall provide permanent or temporary soil stabilization to denuded areas within fifteen (15) days after final grade is reached on any portion of the site. Any such area which will not be regraded for longer than fifteen (15) days shall also be stabilized. Soil stabilization includes any measures which protect the soil from the erosive forces of raindrop impact and flowing water. Applications include seeding and/or mulching, or the use of other erosion control measures as directed by the Owner's Representative. If necessary, the Contractor shall coordinate soil stabilization practices with the local Soil and Water Conservation District.
- D. Spring-sown work shall be installed between April 1st and May 30th and Fall-sown work shall be installed between September 1st and October 15th. No permanent seeding shall take place between May 30th and September 1st and between October 15th and April 1st. The dates for seeding may be changed at the discretion of the Owner's Representative.

PART 2 - PRODUCTS

2.1 TOPSOIL

- A. Topsoil shall be furnished by the Contractor. Stockpiled material, if any, shall be utilized prior to obtaining additional topsoil.
- B. All topsoil shall conform to the U.S. Department of Agriculture soil texturing triangle and shall contain between 3% to 8% organic matter. Topsoil shall be loamy and not consist of more than 38% clay. New topsoil shall be screened to remove clay lumps, brush, weeds, litter, roots, stumps, stones larger than ½" in any dimension and any other extraneous or toxic matter harmful to plant growth.

New topsoil shall be obtained only from naturally well drained sites where topsoil occurs in a depth of not less than 4". Do not obtain from bogs or marshes.

- C. Soil amendments shall be added according to the soils test requirements. Amendments can include, but are not limited to fertilizer, lime, compost, sand, and organic matter. Organic matter shall consist of composted leaves or other approved material.

2.2 SEED

- A. Seed shall be vendor mixed, delivered in original bags and shall be proportioned as follows:

<u>Common Name</u>	<u>Proportion by Weight</u>
Kentucky Blue Grass	50%
Perennial Rye	50%

2.3 MULCH

- A. Mulch shall be clean straw free of seed and weed seed.
 - 1. Anchoring for mulch shall be an ODOT specified SS-1 at 60 gal./ton non-toxic tackifier such as Hydro-stik, or equal, or by securing with a photo degradable netting.

- B. If hydroseeding is used, wood fiber mulching material shall be used and shall consist of virgin wood fibers manufactured expressly from whole wood chips and shall conform to the following specifications.

- Moisture content	10.0% $\pm$ 3.0%
- Organic content	99.2% $\pm$ 0.8% O.D. Basis
- pH	4.8 $\pm$ 0.5
- Water holding capacity, minimum (grams of water per 100 grams of fiber)	1,000

Wood fiber mulching material shall be processed in such a manner as to contain no growth or germination inhibiting factors, and must contain a biodegradable green dye to aid in visual metering during application.

PART 3 - EXECUTION

3.1 PREPARATION - GENERAL

- A. Rough grading to a depth necessary to accept the specified thickness of topsoil must be approved prior to placing topsoil.
- B. Loosen subgrade, remove any stones greater than ½" in any dimension. Remove sticks, roots, rubbish, and other extraneous matter.
- C. Spread topsoil to a minimum depth of 4 inches, to meet lines, grades, and elevations shown on plan, after light rolling and natural settlement. Remove sticks, roots, rubbish, stones

greater than 1/2" in any dimension, and other extraneous matter. Topsoil shall be tilled thoroughly by plowing, disking, harrowing, or other approved methods. Add specified soil amendments and mix thoroughly into the topsoil.

- D. Preparation of Unchanged Grades: Where seed is to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for planting as follows: Till to a depth of not less than 6 inches. Apply soil amendments and initial fertilizers as specified. Remove high areas and fill in depressions. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter. Soils test requirements apply here as well.

1. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of project limits. Do not turn existing vegetation over into soil being prepared for seed.

If necessary, supply and install topsoil in areas where there is no topsoil left after vegetation has been removed.

2. Apply specified soil amendments at rates specified in the soils test and thoroughly mix into upper 2 inches of topsoil. Add topsoil if existing grade has less than 4" of topsoil. Delay application of amendments if planting will not follow within two (2) days.

- E. Fine grade areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Remove sticks, roots, rubbish, stones greater than 1/2" in any dimension, and other extraneous matter. Limit fine grading to areas which can be planted immediately after grading.

- F. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

- G. Restore areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

3.2 SEEDING

- A. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage. Seed shall not be sown when the ground is frozen, muddy, or when weather conditions prevent proper soil preparation, interference with sowing and/or proper incorporation of seed into the soil.
- B. Sow seed using a spreader or hydroseeder. Do not seed when wind velocity exceeds 5 miles per hour. Distribute seed evenly over entire area by sowing 3 lbs. per 1000 S.F. at right angles to each other. Total amount to equal a minimum of 6 lbs. per 1000 S.F.
- C. For seed sown with a spreader, mulch shall be spread uniformly to form a continuous blanket at a rate of 100 lbs. per 1,000 S.F. Mulch shall be 1 1/2" loose measurement over seeded areas and shall be anchored.

- D. Contractor has the option to hydroseed large lawn areas, using equipment specifically designed for such application. The rate of application of wood fiber mulching materials is 40 lbs./1,000 S.F. Contractor shall not hydroseed within close proximity to buildings and structures, or when unfavorable wind conditions may blow the hydroseed material onto the structure. Contractor shall clean all areas not to be seeded of overspray.
- E. The seeded area shall be watered, as soon as the seed is applied, at the rate of 120 gallons per 1000 square feet. The water shall be applied by means of a hydroseeder or a water tank under pressure with a nozzle that will produce a spray that will not dislodge the mulching material. Cost of this watering shall be included in the cost of seeding and mulching.

3.3 DORMANT SEEDING METHOD

- A. Seeding shall not take place from October 15 through November 20. During this period prepare the seed bed, add the required amounts of lime and fertilizer, and other amendments, then mulch and anchor.
- B. From November 20 through April 1, when soil conditions permit, prepare the seed bed, lime and fertilize, apply the selected seed mixture, mulch, and anchor. Increase the seeding rate by 50 percent.

3.4 RECONDITIONING EXISTING LAWNS

- A. A soils test shall be required for existing lawns prior to any reconditioning.
- B. Recondition all existing lawn areas damaged by Contractor's operations including storage of materials and equipment and movement of vehicles. Also recondition existing lawn areas where minor regrading is required.
- C. Provide soil amendments as called for in the soils test.
- D. Provide new topsoil, as required, to fill low spots and meet new finish grades.
- E. Cultivate bare and compacted areas according to the topsoil specifications.
- F. Remove diseased and unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from the Contractor's operations, including oil drippings, stone, gravel, and other loose building materials.
- G. All work shall be the same as for new seeding.
- H. Water newly planted seed areas. Maintenance of reconditioned lawns shall be the same as maintenance of new lawns.

3.5 ESTABLISHMENT

- A. Maintain work areas as long as necessary to establish a uniformly close stand of grass over the entire lawn area. A uniformly close stand of grass is defined as the seeded areas having

90%+ coverage of grass at 60 days after seeding. 90%+ coverage is defined as very little or no dirt showing when seeded area is viewed from directly overhead.

B. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth acceptable lawn.

1. Mowing

- a. Mow lawn areas during the period of maintenance to a height of 2 inches whenever the height of the grass becomes 3 inches. A minimum of 3 mowings is required during the period of maintenance.

2. Refertilizing

- a. Distribute fertilizer on the seeded area between August 15 and October 15, during the period when grass is dry, and in accordance with the manufacturer's recommendations. The fertilizer shall be as specified in the soils test.

3. Reseeding

- a. Reseed with the seed specified for the original seeding, at the rate of 4 lbs. per 1,000 S.F. in a manner which will cause minimum disturbance to the existing stand of grass and at an angle of not less than 15 degrees from the direction of rows of prior seeding.

4. Watering

- a. The Contractor shall keep all work areas watered daily to achieve satisfactory growth. Water shall be applied at a rate of 120 gallons per 1,000 square feet. If water is listed as a pay item, it shall be separately paid for based on the actual amount of water used, measured in thousands of gallons.

- 5. Any mulching which has been displaced shall be repaired immediately. Any seed work which has been disturbed or damaged from the displacement of mulch shall be repaired prior to remulching.

3.6 INSPECTION AND ACCEPTANCE

- A. When seeding work is complete and an acceptable stand of growth is attained, the Contractor shall request the Owner's Representative to make an inspection to determine final acceptance.
- B. Acceptance shall be based upon achieving a vigorous uniformly stand of the specified grasses. If some areas are satisfactory and some are not, acceptance may be made in blocks, provided they are definable or bounded by readily identified permanent surfaces, structures, or other reference means. Partial acceptance decisions may be made by the Owner's Representative. Excessive fragmentation into accepted and unaccepted areas shall not be allowed. Unaccepted areas shall be maintained by the Contractor until acceptable.

- C. No payment shall be made until areas are accepted.
- D. All seeded areas shall be guaranteed for one full growing season to commence upon final acceptance of the areas.

END OF SECTION 329200.19

SECTION 333100 - SANITARY SEWER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnishing all labor, materials, tools, equipment, and services for all sanitary sewers as shown on the Drawings.
- B. Although such is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a functional and complete installation.

1.2 SUBMITTALS

- A. Product Data
 - 1. Ductile iron pipe
 - 2. PVC pipe
 - 3. Manhole Steps
- B. Quality Control Submittals
 - 1. Design Data
 - 2. Test Reports
 - 3. Certificates
 - a. Evidence of current membership in specified manufacturer's associations.
 - 4. Manufacturers Instructions
- C. Contract Closeout Submittals
 - 1. Project Record Documents

1.3 REFERENCES

- A. ASTM A-48 Standard Specification for Gray Iron Castings
- B. ASTM C-1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems
- C. ASTM D-2321 Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe

- D. ASTM D-3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- E. ASTM D-3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- F. ASTM F-477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- G. ASTM F-679 Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

1.4 QUALITY ASSURANCE

- A. Qualifications - Work shall be performed by personal meeting requirements identified in section 014323 – Qualifications of Tradesmen.
- B. Regulatory Requirements – The project is subject to the Build America, Buy American Act (BABA). All materials used for earthwork shall be in accordance with the requirements set forth in BABA.
- C. Certifications – The Contractor shall provide certification that all materials meet requirements identified in plans, specifications, and bid/contract documents.
- D. Field Samples – All pipe and manhole testing shall be in accordance with testing requirements detailed within this section and section 013319 – Field Testing Requirements.

1.5 PROJECT CONDITIONS

- A. Existing Conditions
 - 1. Verify locations of underground utilities.
 - 2. Protect existing structures and utilities from damage. Repair if damaged by this work.
 - 3. Do not change pipe sizes without securing written approval of Engineer.
- B. Field Measurements
 - 1. If it becomes necessary to change location of sanitary sewer lines due to underground utility interference, secure approval of Engineer.
 - 2. If Contractor initiated, make changes approved by the Engineer without added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site, store and protect under provisions of Section 016600 - Product Requirements.
- B. Acceptance at Site
 - 1. All material and all equipment shall be subject to visual inspection and acceptance or rejection after delivery to the site of the work. All rejected material shall immediately be removed from the site.

1.7 SEQUENCING AND SCHEDULING

- A. Perform no pipe work in fill areas until embankment or fill has been completed to at least two (2) feet above proposed top of pipe and fill has been properly compacted.

PART 2 - PRODUCTS

2.1 PIPE

- A. Polyvinyl Chloride Pipe (PVC) (Drain Line/Casing Pipe)
 - 1. Polyvinyl chloride pipe to be used for drains or stilling wells shall conform to ASTM D-1784 SCH 40, shall be solvent weld joint type, with solvents conforming to ASTM F-656 and ASTM D-2564.
 - 2. All pipe and fittings shall be marked or stenciled in conformance with ASTM D-1784, D-1785, and D-2665.
 - 3. Acceptable manufacturers are:
 - a. Charlotte Pipe and Foundry Company
 - b. Or Approved Equal
- B. Ductile Cast Iron Pipe – Pressure Pipe (Exposed)
 - 1. Ductile iron pipe in exposed conditions shall be designed in accordance with ANSI/AWWA C150/A21.50 and manufactured in accordance with ANSI/AWWA C151/A21.51, and shall be Thickness Class 53. Pipe shall be coated as defined in Specification 099635 – Chemical – Resistant Coatings on the outside and shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. Joints shall be flanged in conformance with ANSI/AWWA C111/A21.11 incorporating full faced flat type, rubber gaskets. Gaskets shall be nitrile butadiene rubber meeting ASTM D2000. Flanges shall be Class 125. All hardware shall be stainless steel.
 - 2. All pipe shall be marked or stenciled in conformance with ANSI/AWWA C151/A21.51. All gaskets shall be marked or stenciled with the ASTM specification designation, name or trademark of the manufacturer, and pipe size.
 - 3. Acceptable manufacturers are:

- a. Clow Pipe
- b. U.S. Pipe
- c. Or approved equal

C. Ductile Cast Iron Pipe – Pressure Pipe (Buried)

1. Ductile cast iron pipe shall be designed in accordance with ANSI/AWWA C150/A21.50 and manufactured in accordance with ANSI/AWWA C151/A21.51, and shall be Thickness Class 52. Pipe shall be coated with a bituminous material on the outside and shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. Joints shall be boltless restrained in conformance with ANSI/AWWA C111/A21.11 incorporating rubber gaskets, for buried applications. Fittings to be mechanical joints meeting C111/A21.11 incorporating rubber gaskets.
2. All pipe shall be marked or stenciled in conformance with ANSI/AWWA C151/A21.51. All gaskets shall be marked or stenciled with the ASTM specification designation, name or trademark of the manufacturer, and pipe size.
3. Acceptable manufacturers are:
 - a. Clow Pipe
 - b. U.S. Pipe
 - c. Or approved equal

D. Ductile Cast Iron Pipe – Gravity Pipe

1. Ductile cast iron pipe shall be designed in accordance with ANSI/AWWA C150/A21.50 and manufactured in accordance with ANSI/AWWA C151/A21.51, and shall be Thickness Class 52. Pipe shall be coated with a bituminous material on the outside and shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. Joints shall be mechanical or push-on in conformance with ANSI/AWWA C111/A21.11 incorporating rubber gaskets. Mechanical joints shall be used wherever joint restraint is required. Fittings to be mechanical joints meeting C111/A21.11 incorporating rubber gaskets. Bolts for mechanical joints shall be made of stainless steel.
2. All pipe shall be marked or stenciled in conformance with ANSI/AWWA C151/A21.51. All gaskets shall be marked or stenciled with the ASTM specification designation, name or trademark of the manufacturer, and pipe size.
3. Acceptable manufacturers are:
 - a. Clow Pipe
 - b. U.S. Pipe
 - c. Or approved equal

2.2 MANHOLE STEPS

- A. All steps shall be minimum of twelve (12) inches in width with safety side lugs to prevent slipping and shall conform to the latest OSHA requirements. Manhole steps shall be of polypropylene plastic reinforced with a 3/8", No. 60 grade epoxy coated reinforcing rod.
- B. Acceptable manufacturers are:
 - 1. M. A. Industries, Inc.
 - 2. American Step Company, Inc.
 - 3. Lane International, Inc.

2.3 MASONRY MORTAR

- A. Mortar shall conform to ASTM C-270, Type M, but shall not contain masonry cement.
- B. Mortar shall be UltraMortar Type M as manufactured by UltraKote Products, Inc. or Lafarge Mortar Cement, Type M as manufactured by Lafarge Corporation, or approved equal.
- C. Only sufficient mortar shall be prepared for immediate use, and any mortar that has set shall not be retempered or used in the work.
- D. Setting accelerators or anti-freeze compounds shall not be used.

2.4 COUPLINGS

- A. Couplings for connecting dissimilar pipe materials or pipe sizes shall be a rubber type coupling with a sealing "O" ring under each of two sealing clamp bands and a Type 316 stainless steel shear ring. Coupling shall be manufactured with natural and synthetic rubbers conforming to ASTM C 425 and ASTM C 1173.
- B. Coupling shall be Flex-Seal Adjustable Repair Coupling as manufactured by the Mission Rubber Company, Corona, CA, or approved equal.

PART 3 - INSTALLATION

3.1 ALIGNMENT AND GRADE

- A. Horizontal and Vertical Control
 - 1. All horizontal and vertical control required for the complete layout and performance of the Work under this contract shall be done by a registered surveyor at the Contractor's expense, and any observations by the Engineer of the Contractor's methods will not relieve the Contractor of his responsibility.

2. The Contractor shall be solely responsible for the accuracy of all horizontal and vertical control.
- B. Alignment and grade shall be established by means of a laser beam.
 - C. The Contractor shall furnish all material and labor to establish line and grade of the generated laser beam from the benchmarks and control points indicated on the Drawings. The laser shall be securely anchored and checked periodically by the Contractor. The laser calibration shall be demonstrated when requested by the Engineer. Strict adherence to the manufacturer's operation procedure shall be observed. Only qualified and trained employees may be assigned to install, adjust, or operate laser equipment, and proof of qualifications of the equipment operator must be available at all times. Areas in which lasers are used must be posted with standard laser warning placards, and the laser beam shall be turned off when not needed. During rain, snow, dust, excessive heat, or fog the operation of laser systems shall be prohibited where practicable because of beam scatter.

3.2 PIPE INSTALLATION

- A. All pipe installation shall conform to the trench and bedding details shown on the Drawings.
- B. PVC pipe shall be installed in full compliance with ASTM D-2321.
- C. Only one type and strength of pipe shall be used between any two consecutive manholes, unless otherwise shown on the Drawings.
- D. After the trench has been excavated and the pipe bedded , the pipe shall be laid to the line and grade as shown on the Drawings. All joints shall be made as hereinafter specified. In no case shall any material except bedding material be placed under the bell of the pipe to secure proper grade.
- E. Prior to being lowered into the trench, each pipe shall be carefully inspected and those which are damaged or not meeting the specified requirements shall be rejected and clearly marked as rejected and removed from the Work. Satisfactory means shall be used to hold the pipe in line until embedment of pipe is complete. Precautions shall be taken to insure that the spigot end of the pipe being laid is pushed the proper depth into the bell of the preceding pipe.
- F. All conduit shall be laid starting at the outlet end and laid with the bell end upstream.
- G. In no case shall more than thirty (30) feet of trench be opened in advance of the pipe laying operations.
- H. Conduit shall not be laid in water, mud, or any otherwise unsuitable trench. No drainage shall run through the newly laid pipe. All sewers shall be temporarily

capped with a watertight seal at the open ends at the completion of each day's work and no drainage water shall be permitted to flow through the sewer.

- I. All trenches and excavations shall be backfilled as specified as soon as possible after the pipe is laid and jointed. Where concrete encasement or cradle is used, pipe shall not be backfilled for at least twenty four (24) hours after placing concrete except that pipe may be covered to a depth of not to exceed sixteen (16) inches over the top of the pipe.

3.3 JOINTING

A. Ductile cast iron push-on joints

1. The gasket seat and the gasket shall be thoroughly cleaned and should be wiped with a clean cloth and a thin film of lubricant applied to the inside surface of the gasket that will come in contact with the entering pipe. Use only the lubricant furnished with the pipe. In no case shall a mineral oil or petroleum base lubricant be used.
2. The plain end of the pipe to be jointed shall be thoroughly cleaned and started into the socket so that it is in contact with the gasket. In some cases it may be desirable to apply a thin film of lubricant to the outside of the plain end for about one (1) inch back from the end. The joint is then completed by exerting sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket. Any manufacturer approved method may be used to home the pipe.
3. When laying the pipe in concrete bedding, care shall be exercised to prevent the joint materials from coming in contact with the fresh concrete until after the joint has been completed.

3.4 PERMISSIBLE DEFLECTION AT JOINTS

- A. No pipe deflections or springing of joints, to effect a change in direction will be allowed, except by permission or direction of the Engineer, or as shown on the Drawings. Any permitted or directed deflection shall be a maximum of 80 percent of the allowable deflection value established by the pipe manufacturer.

3.5 MAINTAINING SEWAGE FLOW

- A. The Contractor shall be required to maintain the flow in all existing live sewers during construction and the method employed shall be approved by the Engineer.

3.6 REPLACING, MOVING AND REPAIRING OF EXISTING UTILITIES

- A. The Contractor shall replace, move, support, or repair and maintain all pipes for water, steam, air or gas, and all wire conduit(s), and all other structures encountered in the work and repair all damage done to any of the said structures and appurtenances through his acts or neglect and shall keep them in repair during the

life of the Contract. The Contractor shall in all cases leave them in as good condition as they were previous to the commencement of the work and to the full satisfaction of the Owner.

3.7 CONNECTION TO EXISTING SEWER SYSTEM

- A. The Contractor shall make connections to the existing sewer system as shown on the Drawings. The connections shall be made by the Contractor at such hours that will cause the least disturbance to the flow in the existing sewer system. The Contractor, however, shall notify the Engineer at least five working days in advance of the time he desires to make the connections and no such connections shall be made until the permission of the Engineer is obtained.

3.8 CLEAN-UP

- A. Before final acceptance for the Work, the Contractor shall clear the sewers of any mortar, dirt or other refuse that may have been left or accumulated in the sewers. All manholes and other structures shall be cleared of all forms, scaffolding, bulkheads, centering, surplus mortar, rubbish or dirt and left in a clean and proper condition.

3.9 DEFECTS TO BE MADE GOOD

- A. If, at any time before the completion of the contract, any broken pipes, or any defects, are found in the sanitary sewers or in any of their appurtenances, the Contractor shall cause the same to be removed and replaced by proper material and workmanship, without extra compensation for the labor and material required. All materials shall be carefully examined by the Contractor for defects before placing and any found defective shall not be placed in the line.

END OF SECTION 333100

SECTION 333633.01 – CIRCULAR, PRESTRESSED CONCRETE TANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The qualifications and requirements for the construction of an AWWA D110 Type III wire wound, prestressed, concrete circular tank with a flexible base. This includes all reinforcing, concrete work, prestressing, appurtenances, subgrade preparation, backfilling, disinfection and testing directly related to the tank, unless otherwise specified.
2. The design of the tank shall conform to the requirements of AWWA D110 and ACI 350.
 - a. The tank shall be at grade and the walls and base slab shall be watertight and site cast.
 - b. The tank will be used as an EQ tank and shall have an integral flushing system and collection trench.
 - c. All appendages within the tank and within 6” of the floor shall be designed to minimize the collection of solids in conjunction with the flushing system.
 - d. The use of columns to support the dome are not acceptable.
 - e. The domed roof shall be precast concrete. Aluminum geodesic domes are not acceptable.
 - f. The tank manufacturer shall have single source responsibility of the design of the tank, foundation, and appurtenances related to the tank.

B. Related Requirements:

1. Section 333100 – Sanitary Sewer System.
2. Section 432139 – Submersible Pumps.
3. Section 464614 – Circular Tank Flushing System.

1.2 REFERENCE STANDARDS

- A. ACI 301 Specifications for Structural Concrete
- B. ACI 305 Hot Weather Concreting
- C. ACI 306 Cold Weather Concreting
- D. ACI 309R Guide for Consolidation of Concrete

- E. ACI 318 Building Code Requirements for Reinforced Concrete and Commentary
- F. ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary
- G. ACI 350.3 Seismic Design of Liquid Containing Concrete Structures and Commentary
- H. ACI 372R Design and Construction of Circular Wire- and Strand Wrapped Prestressed Concrete Structures
- I. ACI 506R Guide to Shotcrete
- J. ASTM A123/A123M Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- K. ASTM A416 Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
- L. ASTM A475 Standard Specification for Zinc-Coated Steel Wire Strand
- M. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- N. ASTM A706/A706M Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- O. ASTM A722/A722M Standard Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete
- P. ASTM A1064/A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- Q. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- R. ASTM C33 Standard Specification for Concrete Aggregates
- S. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- T. ASTM C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- U. ASTM C618, Type F Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- V. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 Ft. – lbf/ft³) 600 kN-m/m³)

- W. ASTM C920 Specification for Elastomeric Joint Sealants
- X. ASTM D1056 Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber
- Y. ASTM C1116/C1116M Standard Specification for Fiber-Reinforced Concrete and Shotcrete
- Z. ASTM D1556 Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- AA. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 Ft. – lbf/ft³) 2700 kN-m/m³)
- BB. ASTM D2000 Classification System for Rubber Products in Automotive Applications
- CC. ASCE Standard 7 Minimum Design Loads for Buildings and Other Structures
- DD. AWWA C652 Standard for Disinfection of Water-Storage Facilities
- EE. AWWA D110 Wire and Strand Wound, Circular, Prestressed Concrete Water Tanks
- FF. TID-7024, Dynamic Pressure on Fluid Containers of Nuclear Reactors and Earthquakes
- GG. US Army Corps of Engineers Specification CRD-C-572, Specification for PVC Waterstop

1.3 SUBMITTALS

- A. Prior to submitting a complete drawing package with calculations, submit a preliminary plan, elevation, and sections showing general layout, arrangement and thickness. Provide details to prevent floor appendages from collection of solids during the flushing cycles. The preliminary drawings shall be submitted, at least, 28 days prior to submitting the completed design.
- B. Complete plan, elevation, and sectional views showing critical dimensions including:
 - 1. Size, location and number of all reinforcing bars.
 - 2. Thickness of all parts of the tank structure including floor connections, core wall and cover coat.
 - 3. Prestressing schedule shall include numbers and placement of prestressing wires or strands on the tank wall and total applied force per foot of wall height.
 - 4. Location and details of all accessories required.
 - 5. Complete tank design including top slab, top slab support elements, trench drain system, base slab, base materials, subbase enhancements (if required), and foundation systems utilizing either deep foundation elements or shallow mat/strip foundation.

- C. Concrete design mixes including ingredient proportions, pozzolans, minimum Portland cements content, minimum cementitious content, and water/cementitious ratio without water reducing admixture in accordance with these specifications.
- D. Warranty document in Owner's name in accordance with Contract Documents.
- E. Test Reports: Submit concrete strength reports for 7-day and 28-day breaks.
- F. Structural plans and calculations signed and sealed by a professional engineer registered in Ohio. Plans and calculations shall include all tank foundation systems, structural elements, base material, and sub-base enhancements, if needed.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Following completion of the tank, tank installer shall submit to the Engineer a full set of record drawings which shall include actual location layout and final configuration of tank and accessories. These Drawings shall be incorporated into the Engineers Record Drawings for the project.

1.5 QUALITY ASSURANCE

- A. Singular Responsibility: It is the intent of this specification to require single party responsibility for the design and the construction of the tank. The tank design and construction shall be performed by an established Tank Contractor of recognized ability, having in its own name at least ten years of experience and a minimum of at least twenty AWWA D110 Type III wire wound prestressed concrete core wall as specified herein. The design and construction of all aspects of the foundation, floor slab, wall, prestressing, shotcrete along with the wire wound circular prestressed tank shall be performed by the Tank Contractor. The Tank Contractor may subcontract labor for reinforcing steel installation and for concrete slab placement under the Tank Contractor's direct supervision. The design, construction, testing and quality control of the deep foundation/rock anchor system shall be the responsibility of the Tank Contractor. The Tank Contractor may subcontract labor for the deep foundation/rock anchor installation under the Tank Contractor's direct supervision.

1.6 QUALIFICATIONS

- A. All tank work shall be performed by a company that specializes in the design and construction of wire wound prestressed concrete tanks using the method of circumferential prestress reinforcing and with proven capability of meeting all the requirements of these specifications and AWWA D110. No company is considered qualified unless it has designed and built in its own name at least twenty AWWA D110 prestressed concrete tanks with a Type III core wall in the last ten years which have been in successful service for at least five years. Experience in the design and construction of tanks with a Type I, II or IV core wall is not acceptable.

- B. The Tank Contractor shall have in its employ a design professional engineer with a minimum of ten years of experience in the design of AWWA D110 Type III core wall tanks, registered in the state the tank is to be constructed. The Tank Contractor shall have in its employ a design professional engineer with a minimum of ten tanks with an AWWA D110 Type III core wall in the past five years. The design engineer shall have been the engineer of record for a minimum of ten tanks with an AWWA D110 Type III core wall.
- C. Experience in the design and construction of tanks with an AWWA D110 Type I, Type II or Type IV core wall, tanks having a fixed wall base, mild-steel reinforced core wall or tanks having a core wall incorporating internal stressing systems is not acceptable.

1.7 WARRANTY

- A. Furnish ten-year manufacturer's warranty for all aspects of the tank and accessories. The warranty shall cover the structure of the tank, foundation, leakage, cracks in concrete, wall penetrations, etc. Prorated warranties are not acceptable.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturers:

- 1. DN Tanks.
- 2. Preload LLC.
- 3. Or Approved Equal.

B. Design Criteria:

- 1. The prestressed concrete tank shall be designed and constructed in accordance with the provisions of AWWA D110 Standard for Wire Wound Circular Prestressed-Concrete Water Tanks: Type III; ACI 350, ACI 350.3, ASCE 7 and IBC.
- 2. Requirements and Loadings:
 - a. Capacity: 1.35 million gallons.
 - b. Dimensions: 100 feet inside diameter, 23 feet side water depth.
 - c. Dead Load: shall be the estimated weight of all permanent imposed loads. Unit weight of concrete: 150 pcf; steel: 490 pcf; refer to the soils report or Geotechnical Engineer for the saturation soil weight.
 - d. Live Load: 20 psf. Design roof per the requirements of ASCE 7.
 - e. Snow Load: Estimated at 40 psf including drifting
 - f. Effluent: Unit weight of liquid: 62.4 pcf.
 - g. Wind Loads: shall be as required by ASCE 7.

- h. Walls shall be designed for surcharge(s) based on the top slab transient loads.
 - i. Geotechnical information: Lateral earth pressure, backfill density, bearing pressures, anticipated settlements, subbase coefficient of friction, ground water elevation and seismic site class per Geotechnical Report
 - j. Seismic Criteria:
 - 1) Seismic design shall be based on the applicable sections of AWWA D110, ASCE 7 and the local jurisdictional building code. Impulsive and convective forces, as well as fluid spectral velocity shall be calculated utilizing each code and the maximum value of each component shall be utilized.
 - 2) Risk Category: III
 - 3) Sloshing: The sloshing height shall be calculated using AWWA D110 and ASCE 7.
3. The Type III tank core wall is based on the following design criteria and requirements:
- a. The prestressed tank wall shall be considered as a cylindrical shell with partial edge restraint and rest on a rubber bearing pad allowing free radial movement. A fixed base wall will not be allowed.
 - b. Core wall to be composite precast concrete with steel diaphragm and vertical mild steel reinforcement. Steel wall slot plates shall be utilized between precast panels on the exterior face of the wall along with a ½ inch thick shotcrete cover over the diaphragm and plates.
 - c. Minimum precast wall panel thickness shall be 6 inches.
 - d. Circumferential prestressing to be continuous except at wall penetrations.
 - e. Diaphragm steel may be considered as contributing to the vertical reinforcement of the wall.
 - f. The core wall is that area of the wall interior to all circumferential prestressing.
 - g. Shotcrete thickness shall provide a clear cover over the circumferential prestressing of at least 1/4 inch on intermediate layers. The minimum final shotcrete cover over the circumferential prestressing wire shall be 1 inch.
 - h. For wire wound tanks, a stress plate shall be required at all above grade locations where prestress wires are displaced 24 inches or greater. The stress plate shall be designed to transfer stress across the opening.
 - i. No reduction in ring compression or tension in the tank core wall will be taken due to restraint at the bottom.
 - j. Tank wall systems based on jack-operated cable or rod type tendons, involving the circumferential movement of prestressing steel relative to the wall surface shall not be considered. Circumferential systems relying on strand cables placed inside of ducts (cast in the core wall or manually around the exterior) will not be accepted.
 - k. Shotcrete, cast in place or other alternative core walls are not permitted.
4. Floor Slab:
- a. The design of the deep foundation/rock anchor system shall be in accordance with the recommendations contained in the geotechnical

engineering report and specifications. The deep foundation/rock anchor design and construction drawings shall be prepared by a licensed professional engineer.

- b. Tank Foundation Slab:
 - 1) The tank foundation slab shall be designed to accommodate and transmit the loads from the tank structure and contents to the deep foundation elements. Deep foundation elements shall have a minimum 3 inch embedment into the foundation slab.
 - 2) The tank foundation slab shall be designed incorporating the Environmental Durability Factor and shall comply with ACI 350.
 - 3) Reinforcement shall be conventional reinforcing bars. Minimum cross sectional area ratio of reinforcement to concrete shall be in conformance with ACI 350 for the tank foundation slab.
 - 4) Poly-propylene or cellulose fibers may be used at the Tank Contractor's discretion.
- 5. Wall Base:
 - a. Wall to foundation connection to utilize a continuous 9" minimum vertical PVC ribbed centerbulb waterstop.
- 6. Roof:
 - a. Maximum slope on the roof dome shall have a slope of 1:8 to 1:16.
 - b. Dome shall be constructed of precast or cast-in-place concrete dome panels.
 - c. The dome shall be fixed to the tank wall.
 - d. Columns or interior supports will not be allowed.
 - e. Dome design shall be based on elastic spherical shell analysis.
 - f. The dome thickness shall be no less than 4 inches for precast or 3 inches for cast in place construction.
 - g. The minimum cross sectional area ratio of dome reinforcement to concrete shall be 0.25% in both the circumferential and radial directions. If additional edge bending moments warrant, two layers of non-prestressed reinforcing shall be provided in the meridional direction at the edge region.
 - h. Aluminum geodesic domes are not acceptable.
- 7. Coordinate design to accommodate the flushing system.
 - a. Provide anchoring as needed.

2.2 SUPPLIED BY TANK CONTRACTOR

- A. Concrete and Shotcrete:
 - 1. Concrete and shotcrete shall conform to and be proportioned in accordance with ACI 301 and 506 respectively, except as modified herein.
 - 2. Cement shall be Portland cement Type I, Type IL, Type II or Type I/II.
 - 3. Admixtures, other than air-entraining, superplasticizers, hydration stabilizers, shrinkage reducing and water reducing admixtures will not be permitted unless approved by the Engineer.
 - 4. If air entrainment is utilized, the total volumetric air content of the concrete or shotcrete before placement shall not exceed 8% ($\pm 1.5\%$) as determined by ASTM C173 or ASTM C231.

5. Curing compound to be membrane forming and in accordance with ASTM C309.
6. Concrete for tank wall construction shall have a minimum compressive strength of 4,500 psi at twenty-eight days and a maximum water to cementitious ratio of 0.42.
7. Concrete for the tank floor, footings, pipe encasement and all other work shall have a minimum compressive strength of 4,500 psi at twenty-eight days, does not require air-entrainment and shall have a maximum water to cementitious ratio of 0.42. The coarse and fine aggregate shall meet the requirements of ASTM C33. Superplasticizers, water-reducing, and shrinkage reducing (if applicable) admixtures shall be incorporated into the floor concrete. If fibers are used, they shall be virgin polypropylene or cellulose fibers, Microfiber by Grace, Fibermesh 150-e3 by Propex, UltraFiber 500 by Buckeye, or equal. Fiber lengths shall be a maximum of $\frac{3}{4}$ inches. The amount of fibers added to the concrete mix shall conform to the Manufacturer's recommendations.
8. Shotcrete used for core wall and prestressing wire cover shall consist of not more than three parts sand to one part Portland cement by weight. Final covercoat of shotcrete shall consist of not more than four parts sand to one part Portland cement by weight. Polypropylene fibers shall be included in the shotcrete used for the finish cover coat. Fibers shall be Fibercast 500 by Propex, Fibermesh or equal. Fibers shall be virgin polypropylene and comply with ASTM C1116 performance level I. Fiber length shall be $\frac{1}{4}$ inch. The amount of the fibers added to the shotcrete used for the finish cover coat shall conform to the Manufacturer's recommendations. Fly ash may be incorporated into the finish cover coat. If Fly ash is used, it shall conform to ASTM C618, Type F (or C). Shotcrete shall have a minimum strength of 4,500 psi at twenty-eight days and have a maximum water to cementitious ratio of 0.42.
9. Shotcrete Fine Aggregates:
 - a. The fineness modulus shall be between 2.7 and 3.4. A well-graded coarse sand shall be used for all shotcrete applications.
 - b. The gradation for the fine aggregates shall adhere to the "Grading No. 1" requirements listed in "Table 1.1 – Grading Limits for Combined Aggregates" of ACI 506.
10. All concrete and shotcrete for the tank wall and dome ring shall have a maximum water soluble chloride ion concentration of 0.06% by weight of cementitious. All other concrete which has encased uncoated steel shall have a maximum water soluble chloride ion concentration of 0.1% by weight of cementitious.
11. If utilizing hydration stabilizing admixture, the admixture may be applied after 90 minutes provided the w/c ratio is not exceeded and the slump and temperature remain consistent.
12. The wet mix process shall be utilized for shotcreting.
13. Rebound material shall not be reused in any form for shotcrete.

B. Reinforcing Steel:

1. Reinforcing steel shall be new billet steel Grade 60, as shown on the Drawings, meeting the requirements of ASTM A615. Welded wire fabric and weldable reinforcing steel shall conform to ASTM A1064 and ASTM A706, respectively

2. Reinforcing steel shall be accurately fabricated and shall be free from loose rust, scale, and contaminants, which reduce bond.
 3. Rebar chair supports may be either steel with plastic tips, turned up legs, concrete dobies or plastic.
 4. Galvanized rebar to be Class 1 coating in accordance with ASTM A767 without chromate.
- C. Strand for Base Restraint Cables:
1. Base restraint cables shall be hot-dip galvanized seven-wire strand and shall be manufactured in accordance with ASTM A416 prior to galvanizing, and ASTM A475 after galvanizing. Only seven-wire strand will be allowed. All strands shall have a minimum weight of zinc coating of 0.85 ounces per square foot.
- D. Mortar Fill and Non-Shrink Grout:
1. Mortar fill and non-shrink grout shall have a minimum compressive strength of 4,000 psi at twenty-eight days, have a maximum water to cementitious ratio of 0.42 and meet all requirements for concrete contained in this specification.
- E. Steel Diaphragm and Wall Slot Steel:
1. The steel diaphragm shall conform to ASTM A1008 and shall be a minimum thickness of 0.017 inches. It shall be vertically ribbed with reentrant angles. The back of the channels shall be wider than the front, providing a mechanical keyway anchorage with the concrete and shotcrete encasement.
 2. Wall slot steel to be 10 gauge low carbon steel conforming to ASTM A569. Plate shall not be pickled or oiled.
- F. Circumferential Prestressing Steel:
1. Steel for prestressing shall be cold drawn, high carbon wire.
 2. The wire shall meet the requirements of ASTM A821 and have a minimum ultimate tensile strength of 210,000 psi.
 3. Splices for horizontal prestressing shall be ferrous material compatible with the reinforcement and shall develop the full strength of the wire. Wire splice and anchorage accessories shall not nick or otherwise damage the prestressing.
- G. Elastomeric Materials:
1. Floor to wall connection shall utilize a ribbed waterstop with centerbulb. Construction joints to utilize ribbed flat strip waterstops. Waterstops shall be polyvinyl chloride meeting the requirements of the Corps of Engineers Specification CRD-C 572.
 2. Bearing pads shall be neoprene or rubber.
 - a. Neoprene pads shall have a hardness of 40 durometer and shall meet the requirements of ASTM D2000 Line Call-Out M 2 BC 410 A1 4 B14 or M 2 BC 414 A14 C12 F17 for 40 durometer material.
 - b. Natural rubber bearing pads shall contain only virgin natural polyisoprene as the raw polymer and the physical properties shall comply with ASTM D2000 Line Call-Out M 4 AA 414 A1 3.

3. Neoprene Sponge filler shall be closed-cell neoprene rubber conforming to ASTM D1056, Type 2, Class A, and Grade 1 or 3.

H. Sealants:

1. Polyurethane filler and sealant shall conform to ASTM C290 Type S.
2. Polysulfide sealant will be a two or three component elastomeric compound meeting the requirements of ASTM C920 Type M. Sealants shall have permanent characteristics of bond to metal surfaces, flexibility, and resistance to extrusion due to hydrostatic pressure. Air cured sealants shall not be used.

I. Exterior Coatings:

1. Above grade exterior wall surfaces shall receive two coats of a non-cementitious, high build, 100% acrylic resin polymer such as “Tammscoat Smooth” textured protective coating, “Tnemec Envirocrete 156”, “Sherwin Williams Loxon XP WP” or equal.

J. Appurtenances:

1. Pipe: Refer to Specification Section 333100 – Sanitary Sewer System.
2. Tank Drain Pumps: Refer to Specification Section 432139 – Submersible Pumps.
3. Tank Cleaning System: Refer to Specification Section 464614 – Circular Tank Flushing System.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive Work.
- B. Tank Contractor to conform to and enforce all Local and Federal OSHA safety rules and regulations.

3.2 PREPARATION

- A. The Site Work Contractor shall excavate to such depths and widths to provide adequate room for tank construction and as required in the geotechnical report. All trees, shrubs, brush, stumps, roots, and other unsuitable material shall be removed to a minimum distance of 12 feet outside the edge of the tank foundation, plus additional areas necessary for the tank construction. The working area surface shall be at an elevation of 12” below the top of foundation.
- B. The excavation shall be dewatered as required during construction. The dewatering method used shall prevent disturbance of the tank foundation soils.

- C. In the event the subgrade material is disturbed or over excavated by the Site Work Contractor during excavation, at the direction of the Engineer, it shall be removed and replaced with compacted select fill.
- D. A leveling base material consisting of a minimum 6-inch-thick layer of compacted select fill shall be placed beneath the entire tank foundation. Select fill shall consist of a clean, well graded, angular or sub-angular, $\frac{3}{4}$ " (maximum) base material. The base material shall permit free drainage without the loss of fines or intermixing with subgrade material by limiting the amount of material that passes the No. 200 sieve to a maximum 8 percent by weight of the total base material. Select fill shall be placed in layers not exceeding 6 inches and compacted to a minimum density equal to 95% of the maximum laboratory density in accordance with ASTM D1557. Field testing for density achieved shall be in accordance with ASTM D1556 or D2922. In lieu of select fill, a uniformly graded $\frac{3}{4}$ inch minus crushed stone in accordance with ASTM C33 #67 stone may be used as the leveling base material. Crushed stone shall be placed in layers not exceeding 9 inches and compacted with at least two passes in each direction with vibratory roller compaction equipment. Compaction shall be inspected, and verification of compaction effort shall be documented by an approved testing agency. The surface elevation of the leveling base shall be fine graded to a tolerance of plus zero inches to minus $\frac{1}{2}$ inch over the entire foundation areas. Fine grading tolerances for floor pipe encasements shall be plus zero inches to minus 6 inches.
- E. All fill materials for backfill shall be approved by the Engineer and/or Owner.
 - 1. Rock or concrete spoils (greater than 6 inches) shall not be used in backfill within 2 feet of the tank wall.
 - 2. Earth moving equipment limits for tank backfill installation:
 - a. Within 5 ft of tank wall, only hand operated equipment.
 - b. Between 5 and 15 feet: Maximum weight of 40,000 lbs for non-vibratory and maximum weight of 20,000 lbs for vibratory machinery.

3.3 INSTALLATION

- A. Floor:
 - 1. Prior to placement of the floor reinforcing, a 6 mil polyethylene moisture barrier shall be placed over the leveling base material. Joints in the polyethylene shall be overlapped a minimum of 6 inches.
 - 2. Prior to placement of the floor concrete, all piping that penetrates the floor shall be set and encased in concrete.
 - 3. The vertical waterstop shall be placed and supported so that the bottom of the center bulb is at the elevation of the top of the footing. The waterstop shall be supported without puncturing any portion of the waterstop other than pre-manufactured holes, grommets or hog rings for tying at 12 inches o.c.. The waterstop shall be spliced using a thermostatically controlled sealing iron and each splice shall be inspected using a penknife prior to encasement in concrete. Spark testing of the welded joint shall be permitted.

4. The floor shall be cured using blankets, flooding with water or curing compound. The floor shall remain saturated for a minimum of seven days if curing compound is not utilized.

B. Wall:

1. The precast wall panel shall be constructed with a continuous waterproof steel diaphragm embedded in the exterior of the precast panel. Horizontal joints in the diaphragm will not be allowed.
2. No holes for form ties, nails, or other punctures will be permitted in the wall.
3. Temporary wall openings may be provided for access and removal of construction materials from the tank interior.
4. Polyethylene sheeting shall be placed between successive pours to provide a high moisture environment and a long slow cure for the concrete.
5. Joints between precast wall panels shall be bridged with a steel plate edge sealed with polysulfide or polyurethane and filled with mortar as shown on the drawings. No through-wall ties will be permitted.
6. The steel diaphragm shall extend to within 1 inch of the full height of the wall panel with no horizontal joints. Vertical joints within a wall panel shall be roll seamed or otherwise fastened in a fashion that results in a firm mechanical lock.

C. Roof:

1. Precast panels, if used, shall have polyethylene sheeting placed between successive pours.
2. Removal of roof shoring shall be done at the direction of the Tank Design Engineer.

D. Concrete and Shotcrete:

1. All concrete and shotcrete shall be conveyed, placed, finished, and cured as required by pertinent ACI standards.
2. Reinforcing steel shall be accurately positioned on supports, spacers, hangers, or other reinforcements and shall be secured in place with wire ties or suitable clips.
3. Weather Limitations:
 - a. Unless specifically authorized in writing by the Engineer, concrete and shotcrete shall not be placed without special protection during cold weather when the ambient temperature is below 35 degrees F, below 40 degrees F and falling or when the concrete is likely to be subjected to freezing temperatures before initial set has occurred and the concrete strength has reached 500 psi. The temperature of the concrete shall be maintained in accordance with the requirements of ACI 301 and ACI 306. All methods and equipment for heating and for protecting concrete in place shall be subject to the approval of the Engineer.
 - b. During hot weather, concreting and shotcreting shall be in accordance with the requirements of ACI 301, ACI 305 and ACI 506.
4. Finishes:
 - a. The floor slab shall receive a fresno or bullfloat at the option of the contractor. The top of the wall footing, exterior to the waterstop, shall receive a steel trowel or magnesium trowel finish.

- b. The interior surface of the tank wall shall receive a horizontal light broom finish.
 - c. Exterior shotcrete shall receive a natural gun/nozzle finish.
 - d. For all formed concrete surfaces, all irregularities that project greater than 1/4" from the surface shall be ground off. All holes greater than 3/4" wide or 1/2" deep should be patched.
 - e. Roof shall receive a light broom finish and a form on the bottom and edge surfaces.
5. Concrete shall be cured using water methods, sealing materials, or curing compounds. Curing compounds shall not be used on surfaces to which decorative coatings, mortar, or shotcrete is to be applied.
 6. Each prestress wire shall be individually encased in shotcrete.
 7. Finish cover coat shotcrete shall be applied as soon as practical after the last application of wire coat.
 8. Shotcrete shall be applied by, or under the supervision of, an ACI 506 certified nozzleman.
 9. Total cover coat thickness shall be controlled by shooting guide wires. Vertical wires shall be installed under tension and spaced no more than two feet apart to establish uniform and correct coating thickness. Monofilament line (100 lb. test) or 18 or 20 gauge high tensile strength steel wire shall be used. Guide wires shall be removed after placement of the cover coat.
 10. Testing:
 - a. For concrete placed in the precast panels or wall slots, a set of three cylinders shall be made for each truck load of concrete placed. For concrete placed in the floor, dome ring or dome slots, two sets of five cylinders for the first 50 cubic yards, and one set of five cylinders for every 100 cubic yards thereafter placed in the same day. Two cylinders shall be tested at seven days, two at twenty-eight days, and one held as a spare.
 - b. Slump, air content and temperature testing shall be performed on each truck where cylinders are taken.
 - c. Testing of shotcrete shall be in accordance with ACI 506, except as specified herein. One test panel shall be made for each of the following operations: core wall, wire or strand cover, and cover coat. Test panels shall be made from the shotcrete as it is being placed. The method of making a test sample shall be as follows: A frame of wire fabric (1 foot square, 3 inches in depth) shall be secured to a plywood panel and hung in the location where shotcrete is being placed. This vertical form shall be filled in layers. After twenty-four hours, the fabric and plywood backup shall be removed and the sample slab placed in a safe location at the site.
 - d. The shotcrete sample slab shall be cured in a manner identical with the regular surface application. The sample slab shall be sent to the testing laboratory. Nine 3 inch cubes shall be cut from the sample slab and subjected to compression tests in accordance with current ASTM Standards. Three cubes shall be tested at the age of seven days, three shall be tested at the age of twenty-eight days, and three shall be retained as spares.

- e. All testing shall be in accordance with ASTM C31 and C39 and shall be conducted by an independent testing agency approved by the Engineer.

E. Circumferential Prestressing:

1. Prestressing wire shall be placed on the wall with a machine capable of consistently producing a stress in the wire within a range of minus 7% to plus 7% of the stress required by the design. No circumferential movement of the prestressing along the tank wall will be permitted during or after stressing. Stressing may be accomplished by drawing the wire through a die or by another process that results in uniform stress throughout its length.
2. Ends of individual coils shall be joined by suitable steel splicing devices capable of developing the full strength of the prestressing wire.
3. Circumferential stressing systems based on jack-operated cable or rod-type tendons will not be allowed.
4. Minimum clear distance between prestressing wire is 5/16 inch or 1.5 wire diameters, whichever is greater.
5. The Tank Contractor shall furnish a calibrated stress recording device, which can be recalibrated, to be used in determining the wire stress on the wall during and after the prestressing process. At least one stress reading per vertical foot or one stress reading for every roll of prestressing, whichever is greater, shall be taken after the wire has been applied on the wall. The Tank Contractor shall keep a written record of stress readings. All stress readings shall be made on straight lengths of wire. If applied stresses fall below the design stress in the steel, additional wire will be provided to bring the force on the core wall up to the required design force. If the stress in the steel is more than 7% over the required design stress, the wrapping operation should be discontinued, and satisfactory adjustment made to the stressing equipment before proceeding.

F. Exterior Coating:

1. All Work shall be performed by workmen skilled in the application of these types of products. The Manufacturer's application instructions shall be submitted to the Engineer for approval. The Contractor shall confer with the Manufacturer's representatives regarding application techniques and shall follow the Manufacturer's instructions implicitly.
2. The concrete surface to be coated shall be clean, free of all laitance, dirt, grease, or other foreign materials. All defective surfaces shall be filled and/or repaired. Application shall be in full accordance with the manufacturer's instructions or as amended by the Engineer.

3.4 TESTING

- A. Prior to backfill placement and placing tank in service, the tank shall be leakage tested.
- B. Testing shall require that the tank be filled with water furnished by the Contractor.

- C. The tank shall remain filled for a period of at least 48-hours to allow for absorption and initial settlement.
- D. The liquid volume loss for a period of 24 hours shall not exceed one-tenth of one percent on the tank capacity after accounting for evaporation and precipitation:
 - 1. If the liquid volume loss exceeds this amount, leakage shall be considered excessive and the tank shall be repaired and retested.
 - 2. Or, if during the testing, damp spots or seepage is present on areas exposed to view, the tank shall be repaired and retested.
 - 3. All repair procedures shall be approved by the Engineer.

END OF SECTION 032313

SECTION 334100 - STORM DRAINAGE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. Furnishing all labor, materials, tools, equipment, and services for all storm sewers as shown on the Drawings.

1.2 RELATED DOCUMENTS AND SECTIONS

- A. Section 013543 – Environmental Protection
- B. Section 013319 – Field Testing Requirements
- C. Section 310000 - Earthwork

1.3 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Granular pipe bedding and cover material specified in Section 310000 - Earthwork
- B. Special backfill material specified in Section 310000 - Earthwork

1.4 SUBMITTALS

- A. Product Data
 - 1. Polyethylene pipe
 - 2. Manhole castings
 - 3. Precast concrete manholes and inlets
 - 4. Manhole steps
- B. Shop Drawings
 - 1. Precast concrete manholes showing:
 - a. Orientation plan for each manhole or inlet indicating where all pipes connect.
 - b. The size and elevation of connecting pipes.
 - c. Invert concrete channeling details.
 - d. Pipe to manhole connection details.
 - e. Casting and step orientation.
 - 2. Precast concrete inlets
- C. Samples
- D. Quality Control Submittals
 - 1. Design Data
 - 2. Test Reports
 - 3. Certificates

- a. Evidence of current membership in specified manufacturer's associations.
 - b. Evidence of National Precast Concrete Association (NPCA) certification for the manufacture of precast concrete manholes, inlets and catch basins.
- 4. Manufacturers Instructions
- E. Contract Closeout Submittals
 - 1. Project Record Documents
 - 2. Operation and Maintenance

1.5 REFERENCES

- A. ASTM C-150 Standard Specification for Portland Cement
- B. ASTM C-443 Standard Specifications for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- C. ASTM C-478 Standard Specifications for Precast Reinforced Concrete Manhole Sections
- D. ASTM C-990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- E. ASTM C-1173 Standard Specification for Flexible Transition Couplings for Underground Piping Systems
- F. ASTM D-2321 Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
- G. ASTM D-3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- H. ASTM D-3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- I. State of Ohio - Department of Transportation - Construction and Material Specifications as amended to date, Item 703.03, Fine Aggregate for Mortar or Grout.
- J. State of Ohio - Department of Transportation - Construction and Material Specifications as amended to date, Item 706.10, Bituminous Pipe Joint Filler
- K. State of Ohio - Department of Transportation - Construction and Material Specifications as amended to date, Item 706.13, Precast Reinforced Concrete Manhole Riser Sections, Catch Basin and Inlet Tops, and Temporary Barrier

- L. State of Ohio - Department of Transportation - Construction and Material Specifications as amended to date, Item 707.33, Corrugated Polyethylene Smooth Lined Pipe

1.6 QUALITY ASSURANCE

- A. Qualifications
- B. Regulatory Requirements
- C. Certifications
- D. Field Samples
- E. Pre-Installation Conference

1.7 PROJECT CONDITIONS

- A. Environmental Requirements
- B. Existing Conditions
 - 1. Verify locations of underground utilities.
 - 2. Protect existing structures and utilities from damage. Repair if damaged by this work.
 - 3. Do not change pipe sizes without securing written approval of Engineer.
- C. Field Measurements
 - 1. If it becomes necessary to change location of storm drainage lines due to underground utility interference, secure approval of Engineer.
 - 2. If Contractor initiated, make changes approved by the Engineer without added cost to Owner.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping
- B. Acceptance at Site
 - 1. All material and all equipment shall be subject to visual inspection and acceptance or rejection after delivery to the site of the work. All rejected material shall immediately be removed from the site.
- C. Storage and Protection

1.9 SEQUENCING AND SCHEDULING

- A. Perform no pipe work in fill areas until embankment or fill has been completed to at least two (2) feet above proposed top of pipe and fill has been properly compacted.

PART 2 - PRODUCTS

2.1 PIPE

- A. Corrugated Polyethylene Pipe 12" Diameter and Larger
 - 1. All corrugated polyethylene pipe in this size range shall be smooth lined conforming to ODOT 707.33. All pipe and fittings shall be marked or stenciled with the appropriate classification.

2.2 PRECAST REINFORCED CONCRETE MANHOLE RISER SECTIONS, INLETS AND CATCH BASINS

- A. All precast concrete units shall conform to ASTM C-478 and ODOT Item 706.13.
- B. Joints between manhole units shall be gasketed and shall comply with the requirements of ASTM C-443. All gaskets shall be marked or stenciled with the ASTM specification designation, name or trademark of the manufacturer, and pipe size.
- C. Joints between inlet or catch basin sections shall be sealed with material conforming to ODOT Item 706.10.
- D. The standard length of manhole riser units shall be 48 inches. Lengths of 32 inches or 16 inches shall be used to meet required dimensions.
- E. Openings for connecting pipes in riser units, bottom riser units, integral base units, and for access in flat slabs shall be preformed or cored by the manufacturer. Cut-out openings shall be made immediately after the pipe is removed from the casting form.
- F. Connectors between new precast concrete manholes and pipes shall be made by casting the connector integrally with the manhole wall. The connectors shall be "X-Cel" Type as manufactured by A-Lok Products; or an approved equivalent.
- G. All openings in existing manholes, inlets or catch basins shall be field cored.
- H. Annular spaces at pipe entrances shall be field sealed with a one component, hydraulic cement based, fast setting repair mortar equal to Thoro Products Waterplug as manufactured by ChemRex Inc., Shakopee, MN.
- I. The top four (4) inches to twelve (12) inches of the manhole shall provide for adjustment of casting to grade. Adjustment shall be through the use of a maximum of two (2) precast concrete adjusting collars.
- J. Precast concrete shall be manufactured by an NPCA certified plant.

2.3 MASONRY MANHOLE RISERS, INLETS AND CATCH BASINS

- A. General
 - 1. All inlets and catch basins shall be constructed of precast concrete unless the project involves reconstruction of existing inlets/catch basins.
- B. Concrete Masonry Block
 - 1. Block used in catch basins, inlets, storm manholes, and storm junction chambers shall be concrete masonry block conforming to ASTM C-139. The exterior of the masonry structures shall be parged with one-half (½) inch mortar.
- B. Acceptable manufacturers are:
 - 1. East Jordan Iron Works
 - 2. Neenah

PART 3 - INSTALLATION

3.1 ALIGNMENT AND GRADE

- A. Horizontal and Vertical Control
 - 1. All horizontal and vertical control required for the complete layout and performance of the Work under this contract shall be done by a registered surveyor at the Contractor's expense, and any observations by the Engineer of the Contractor's methods will not relieve the Contractor of his responsibility.
 - 2. The Contractor shall be solely responsible for the accuracy of all horizontal and vertical control.
- B. Alignment and grade shall be established by means of a laser beam.
- C. The Contractor shall furnish all material and labor to establish line and grade of the generated laser beam from the benchmarks and control points indicated on the Drawings. The laser shall be securely anchored and checked periodically by the Contractor. The laser calibration shall be demonstrated when requested by the Engineer. Strict adherence to the manufacturer's operation procedure shall be observed. Only qualified and trained employees may be assigned to install, adjust, or operate laser equipment, and proof of qualifications of the equipment operator must be available at all times. Areas in which lasers are used must be posted with standard laser warning placards, and the laser beam shall be turned off when not needed. During rain, snow, dust, excessive heat, or fog the operation of laser systems shall be prohibited where practicable because of beam scatter.

3.2 PIPE INSTALLATION

- A. All pipe installation shall conform to the trench and bedding details shown on the Drawings.

- B. PVC pipe shall be installed in full compliance with ASTM D-2321. Clay pipe shall be installed in full compliance with ASTM C-12. All concrete pipe shall be installed in conformity with recommended practices published by the American Concrete Pipe Association in the "Concrete Pipe Installation Manual".
- C. Only one type and strength of pipe shall be used between any two consecutive manholes, unless otherwise shown on the Drawings.
- D. After the trench has been excavated and the pipe bedded, the pipe shall be laid to the line and grade as shown on the Drawings. All joints shall be made as hereinafter specified. In no case shall any material except bedding material be placed under the bell of the pipe to secure proper grade.
- E. Prior to being lowered into the trench, each pipe shall be carefully inspected and those which are damaged or not meeting the specified requirements shall be rejected and clearly marked as rejected and removed from the Work. Satisfactory means shall be used to hold the pipe in line until embedment of pipe is complete. Precautions shall be taken to insure that the spigot end of the pipe being laid is pushed the proper depth into the bell of the preceding pipe.
- F. All conduit shall be laid starting at the outlet end and laid with the bell end upstream.
- G. In no case shall more than thirty (30) feet of trench be opened in advance of the pipe laying operations.
- H. Conduit shall not be laid in water, mud, or any otherwise unsuitable trench. No drainage shall run through the newly laid pipe. All sewers shall be temporarily capped with a watertight seal at the open ends at the completion of each day's work and no drainage water shall be permitted to flow through the sewer.
- I. All trenches and excavations shall be backfilled as specified as soon as possible after the pipe is laid and jointed. Where concrete encasement or cradle is used, pipe shall not be backfilled for at least twenty four (24) hours after placing concrete except that pipe may be covered to a depth of not to exceed sixteen (16) inches over the top of the pipe.

3.3 JOINTING

- A. Corrugated Polyethylene Pipe
 - 1. Corrugated polyethylene pipe shall be jointed using split couplers. The ends of pipe to be joined must be cut along the centerline of the valleys of the annular corrugations. The gasket shall be placed in the first full corrugation valley. The coupler shall be placed in position on the pipe in the trench. The next pipe shall be brought up against the first and aligned with the corrugations on the coupler. A check on the pipe and coupler should be made to ensure that no foreign material is present to interfere with the connection. The coupler shall then be snugged around the pipes and secured

with bands. The coupler shall be wide enough to cover two (2) pipe corrugations on each side of the joint.

3.4 PERMISSIBLE DEFLECTION AT JOINTS

- A. No pipe deflections or springing of joints, to effect a change in direction will be allowed, except by permission or direction of the Engineer, or as shown on the Drawings. Any permitted or directed deflection shall be a maximum of 80 percent of the allowable deflection value established by the pipe manufacturer.

3.5 MANHOLES

- A. Build each manhole to dimensions shown on Drawings and at such elevation that pipe sections built into wall of manhole will be true extensions of line of pipe.
- B. Set frames for manholes, within areas to be paved, to final grade. In asphalt pavement, surround frames set to grade with a ring of compacted asphalt concrete base material immediately after backfilling operations are complete. Place asphalt concrete mixture up to one (1) inch below top of frame, slope to grade, and compact with hand tamp.
- C. Storm manholes shall be constructed of precast concrete manhole sections, concrete masonry block, or concrete brick.
- D. Precast Concrete Manholes
 1. Precast bases shall be placed on a bed of crushed gravel or crushed limestone, meeting AASHTO M 43 gradation, having a minimum thickness of three (3) inches. The bedding shall be compacted and provide uniform support for the entire area of the base.
 2. Provision shall be made for a minimum of four (4) inches and a maximum of twelve (12) inches of precast concrete grade rings between the uppermost precast section and the bottom of the cast iron manhole frame in order to set manhole cover to grade.
 3. No more than two lifting holes or other lifting devices shall be utilized for handling the precast sections. All lifting holes shall be acceptably sealed with a hydraulic cement based, fast setting repair mortar, meeting the requirements of Article 2.2 of this Section, prior to backfilling around the manhole.
 4. Inverts shall be formed to the equivalent of half-pipes in concrete and as follows:
 - a. Carry concrete out to the manhole wall with a slope of $\frac{1}{2}$ in./ft. from the top of the half-pipe.
 - b. The bottoms of all manholes shall be channeled to conduct flow in the planned direction. Channels shall be the true shape of the lower half of the sewer pipe and shall match inverts of connecting pipe at the manhole wall.

3.6 INLETS AND CATCH BASINS

- A. Catch basins and inlets shall be built in accordance with the Drawings. Precast units shall be placed on a sand bed having a minimum thickness of three (3) inches. The bedding shall be compacted and provide uniform support for the entire area of the base.
- B. Set frames for catch basins and inlets, within areas to be paved, to final grade. Surround frames set to grade with a ring of compacted asphalt concrete base material immediately after backfilling operations are complete. Place asphalt concrete mixture up to one (1) inch below top of frame, slope to grade, and compact with hand tamp.

3.7 MAINTAINING FLOW

- A. The Contractor shall be required to maintain the flow in all existing live sewers during construction and the method employed shall be approved by the Engineer.

3.8 REPLACING, MOVING AND REPAIRING OF EXISTING UTILITIES

- A. The Contractor shall replace, move, support, or repair and maintain all pipes for water, steam, air or gas, and all wire conduit(s), and all other structures encountered in the work and repair all damage done to any of the said structures and appurtenances through his acts or neglect and shall keep them in repair during the life of the Contract. The Contractor shall in all cases leave them in as good condition as they were previous to the commencement of the work and to the full satisfaction of the Owner.

3.9 CONNECTION TO EXISTING SEWER SYSTEM

- A. The Contractor shall make connections to the existing sewer system as shown on the Drawings. The connections shall be made by the Contractor at such hours that will cause the least disturbance to the flow in the existing sewer system. The Contractor, however, shall notify the Engineer at least five working days in advance of the time he desires to make the connections and no such connections shall be made until the permission of the Engineer is obtained.

3.10 CLEAN-UP

- A. Before final acceptance for the Work, the Contractor shall clear the sewers of any mortar, dirt or other refuse that may have been left or accumulated in the sewers. All manholes and other structures shall be cleared of all forms, scaffolding, bulkheads, centering, surplus mortar, rubbish or dirt and left in a clean and proper condition.

3.11 DEFECTS TO BE MADE GOOD

- A. If, at any time before the completion of the contract, any broken pipes, or any defects, are found in the storm sewers or in any of their appurtenances, the Contractor shall cause the same to be removed and replaced by proper material and workmanship, without extra compensation for the labor and material required. All materials shall be carefully examined by the Contractor for defects before placing and any found defective shall not be placed in the line.

END OF SECTION 334100

SECTION 335100 - NATURAL GAS DISTRIBUTION

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 the following for natural gas distribution outside the building:
 - 1. Piping.
 - 2. Valves.
 - 3. Pressure Regulators
 - 4. Service meters.

1.3 DEFINITIONS

- A. Gas Service: Pipe from gas main or other source to gas point of delivery for building or buildings being served. Piping includes gas service piping, gas valve, service pressure regulator, meter bar or meter support, and gas meter.
- B. Gas Delivery Point: Gas meter or service pressure regulator outlet, or gas service valve if gas meter is not provided.
- C. Gas Distribution: Piping from service-meter assemblies (gas delivery point) to buildings.
- D. PE: Polyethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Minimum Working-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum, unless otherwise indicated.
 - 2. Service Regulators: 100 psig minimum, unless otherwise indicated.
- B. Line Pressure:
 - 1. Upstream of meter assembly: Coordinate with Gas Company.
 - 2. Downstream of meter assembly: See Plans.

1.5 SUBMITTALS

- A. Product Data: For the following:

1. PE pipe and fittings.
2. Valves.
3. Pressure Regulators.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For the following natural gas distribution equipment and accessories to include in emergency, operation, and maintenance manuals.

1. Valves.
2. Pressure Regulators.

1.6 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of earthquake valves and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- C. Comply with requirements of utility supplying natural gas and with authorities having jurisdiction for natural gas systems.
- D. Comply with the International Fuel Gas Code for materials, installation, testing, inspection, and purging.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store PE pipes and valves protected from direct sunlight.

1.8 PROJECT CONDITIONS

- A. Verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing Natural Gas Service: Do not interrupt natural gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of gas supply according to requirements indicated:
 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of natural gas service.
 2. Do not proceed with interruption of natural gas service without Construction Manager's written permission.

1.9 COORDINATION

- A. Coordinate service meter assembly work with Gas Company.
- B. Coordinate natural gas distribution with other utility Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPES AND FITTINGS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, fitting, and joining materials.
- B. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B; Schedule 40, black.
 - 1. Malleable-Iron Fittings: ASME B16.3, Class 150, standard pattern, with threads complying with ASME B1.20.1.
 - 2. Steel Fittings: ASME B16.9, wrought-steel butt-welding type; and ASME B16.11, forged steel.
 - 3. Steel Flanges and Flanged Fittings: ASME B16.5.
 - 4. Unions: ASME B16.39, Class 150, black malleable iron; female pattern; brass-to-iron seat; ground joint.
- C. PE Pipe: ASTM D 2513, SDR 11.
 - 1. PE Fittings: ASTM D 2683, socket type or ASTM D 3261, butt type with dimensions matching ASTM D 2513, SDR 11, PE pipe.
- D. Transition Fittings: Manufactured pipe fitting with one PE pipe end for heat-fusion connection to PE pipe and with one ASTM A 53/A 53M, Schedule 40, steel pipe end for threaded connection to steel pipe.
- E. Service-Line Risers: Manufactured PE pipe fitting with PE pipe inlet for heat-fusion connection to underground PE pipe; PE pipe riser section with protective-coated, anodeless, steel casing and threaded outlet for threaded connection to aboveground steel piping.

2.3 JOINING MATERIALS

- A. Components, Tapes, Gaskets, and Bolts and Nuts: Suitable for natural gas and as recommended by piping manufacturer.

2.4 SHUTOFF VALVES

- A. Shutoff Valves, General: Manual operation, suitable for natural gas service, and with 100-psig minimum working-pressure rating.
- B. Lubricated Plug Valves: Cast-iron body, with lubricated, bronze or nickel-plated cast iron plug; lever lockwing operator; and complying with ASME B16.33, MSS SP-78, UL 842. Include locking device. Painted, suitable for exterior environment.
 - 1. Manufacturers:
 - a. Flowserve.
 - b. Homestead Valve, a division of Olsen Tech., Inc.
 - c. McDonald: A.Y. McDonald Mfg. Co.
 - d. Milliken Valve Co., Inc.

2.5 SERVICE METERS

- A. Service Meters, Pressure Regulators, and Service-Meter Bars: Per Gas Company requirements.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 31 Section "Earthwork" for excavating, trenching, and backfilling.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off gas to premises or piping section.
- B. Inspect natural gas piping according to the International Fuel Gas Code to determine that natural gas utilization devices are turned off in piping section affected.
- C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 PIPING APPLICATIONS

- A. Flanges, unions, and transition and special fittings with pressure ratings same as or higher than system pressure rating may be used, unless otherwise indicated.
- B. Aboveground Piping:
 - 1. NPS 2 and Smaller: Steel pipe, malleable-iron fittings, and threaded joints.
 - 2. NPS 2-1/2 and Larger: Steel pipe, butt-welding-type fittings, and welded joints. Joints for connection to service regulators, service meters, and valves with flanged connections may be flanged. Joints for connection to service regulators, service meters, and valves with threaded connections NPS 2-1/2 to NPS 4 may be threaded.

- C. Underground Piping: PE pipe, PE fittings, and heat-fusion joints.
- D. Underground-to-Aboveground Piping Connections: Service-line riser.
- E. PE-to-Steel Piping Connections: Transition fitting.

3.4 VALVE APPLICATIONS

- A. Drawings indicate types of shutoff valves to be used. If specific types are not indicated, the following requirements apply:
 - 1. Aboveground, NPS 2 and Smaller: Lubricated tapered plug valves.
 - 2. Aboveground, NPS 2-1/2 and Larger: Lubricated plug valves.

3.5 PIPING INSTALLATION

- A. Install underground, natural gas distribution piping with bury depth as indicated on the plans, or 36-inches bury depth if not indicated.
- B. Install underground, PE, natural gas distribution piping according to ASTM D 2774.

3.6 SERVICE-METER ASSEMBLY INSTALLATION

- A. Install service-meter bars, regulators, and valves per Gas Company drawings and specifications.
- B. Coordinate meter installation with Gas Company.

3.7 VALVE INSTALLATION

- A. Install metal shutoff valves on aboveground, natural gas distribution piping.

3.8 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect gas distribution piping to service-meter assemblies and points indicated. Connect gas distribution piping to equipment as indicated on the drawings.
- C. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
- D. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
- E. Install aboveground, natural gas distribution piping upstream from equipment shutoff valves, electrically continuous, and bonded to grounding electrode according to NFPA 70.
- F. Do not use natural gas distribution piping as grounding electrode.

3.9 LABELING AND IDENTIFYING

- A. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tape over natural gas distribution piping during backfilling of trenches for piping.
- B. Refer to Division 31 Section "Earthwork" for warning tapes.

3.10 PAINTING

- A. Refer to Division 09 Section "Painting" for field-applied finishes.
- B. Paint all exposed metal piping, valves, service regulators, service meters and meter bars, earthquake valves, supports, and piping specialties except units with factory-applied paint or protective coating.
- C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

- A. Test, inspect, and purge natural gas distribution according to requirements of the International Fuel Gas code and utility.
- B. Repair leaks and defective valves and specialties and retest system until no leaks exist.
- C. Report results in writing.
- D. Verify correct pressure settings for service regulators.

END OF SECTION 335100

SECTION 400507 - PROCESS PIPE HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hangers and supports for process piping systems and equipment.

1.2 DEFINITIONS

- A. Terminology used in this Section is defined in MSS SP-90.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of hanger and support.
- C. Submit pipe hanger and support schedule showing manufacturer's Figure No., size, location, and features for each required pipe hanger and support.
- D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- E. Shop Drawings shall be signed and sealed by a qualified professional engineer for multiple piping supports and trapeze hangers. Include design calculations and indicate size and characteristics of components and fabrication details. Shop drawings for each type of hanger and support, indicating dimensions, weights, required clearances, and methods of component assembly.

1.4 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators according to AWS D1.1 "Structural Welding Code-Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
- C. NFPA Compliance: Comply with NFPA 13 for hangers and supports used as components of fire protection systems.

- D. Listing and Labeling: Provide hangers and supports that are listed and labeled as defined in NFPA 70, Article 100.
 - 1. UL and FM Compliance: Hangers, supports, and components include listing and labeling by UL and FM where used for fire protection piping systems.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 PERFORMANCE REQUIREMENT

- A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design heavy-duty steel trapezes for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Hangers, Supports, and Components: Factory-fabricated according to MSS SP-58.
 - 1. Pipe attachments include nonmetallic coating for electrolytic protection where supports are in direct contact with metallic pipe.

2.2 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A276, stainless steel plates, shapes, and bars.
- B. Bolts and Nuts: Stainless steel.
- C. Washers: stainless steel, flat washers.
- D. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.
 - 1. Characteristics include post-hardening, volume-adjusting, dry, hydraulic-cement-type grout that is nonstaining, noncorrosive, nongaseous and is recommended for both interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Water: Potable.
 - 4. Packaging: Premixed and factory-packaged.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATION

- A. Specific hanger requirements are specified in the Section specifying the equipment and systems.
- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping specification Sections.

3.2 HANGER AND SUPPORT INSTALLATION

- A. General: Comply with MSS SP-69 and SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible.
- C. Install supports with maximum spacings complying with MSS SP-69.
- D. Where pipes of various sizes are supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
- E. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Install reinforcing bars through openings at top of inserts.
- F. Install concrete inserts in new construction prior to placing concrete.
- G. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install according to fastener manufacturer's written instructions. Do not use in lightweight concrete slabs or in concrete slabs less than 4 inches (100 mm) thick.
- H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- I. Heavy-Duty Steel Trapezes: Field-fabricate from ASTM 304 stainless steel shapes selected for loads being supported. Weld steel according to AWS D-1.6.
- J. Install hangers and supports to allow controlled movement of piping systems, permit freedom of movement between pipe anchors, and facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- K. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

- L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so that maximum pipe deflections allowed by ASME B31.9 "Building Services Piping" is not exceeded.

3.3 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field-weld connections that cannot be shop-welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.6 procedures for manual shielded metal-arc welding, appearance and quality of welds, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.5 WARRANTY

- A. The equipment supplier shall warrant for a period of 12 months that its equipment shall be free from defects in material and workmanship; and that it will replace or repair, F.O.B. its factory, any part or parts returned to it which examination shall show to have failed under normal use and service by the user. Warrantee period will commence upon completion of all project improvements.

END OF SECTION 400507

SECTION 400551 - COMMON REQUIREMENTS FOR PROCESS VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Valves.
2. Valve actuators.

1.2 COORDINATION

- A. Coordinate Work of this Section with piping, equipment, and appurtenances.

1.3 SUBMITTALS

A. Product Data:

1. Valves.
2. Valve actuators.

B. Shop Drawings:

1. Indicate parts list, materials, sizes, position indicators, limit switches, control system actuator mounting, wiring diagrams, control system schematics.
2. Signed and sealed by the qualified professional engineer responsible for their preparation.

C. Valve-Labeling Schedule: Indicate valve locations and nametag text.

D. Certification of Valves Larger Than 12 Inches (305 mm): Furnish certified copies of hydrostatic factory tests, indicating compliance with applicable standards.

E. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for sizing of control valves.

F. Source Quality-Control Reports: For valves and valve actuators.

G. Field Quality-Control Reports: For valves and valve actuators.

1. Qualifications Statements: For manufacturer and licensed professional.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of valves and actuators.

1.5 QUALITY ASSURANCE

- A. Maintain clearances as indicated on Drawings.
- B. Ensure that materials of construction of wetted parts are compatible with process liquid.
- C. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Protect valve ends from entry of foreign materials by providing temporary covers and plugs.
 - 3. Provide additional protection according to manufacturer instructions.

1.7 WARRANTY

- A. Furnish one-year manufacturer's warranty for valves and actuators.

PART 2 - PRODUCTS

2.1 VALVES

- A. Description: Valves, operator, actuator, handwheel, chainwheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and other accessories as required.
- B. Valve Ends: Compatible with adjacent piping system.
- C. Operation:
 - 1. Open by turning counterclockwise; close by turning clockwise

2. Cast directional arrow on valve or actuator with OPEN and CLOSE cast on valve in appropriate location.

D. Valve Marking and Labeling:

1. Marking: Comply with MSS SP-25.
2. Labeling: As specified in valve schedule.

E. Valve Construction:

1. Bodies: Rated for maximum temperature and pressure to which valve will be subjected as specified in valve Sections.
2. Bonnets:
 - a. Clamped, screwed, or flanged to body and of same material and pressure rating as body.
 - b. Furnish glands, packing nuts, or yokes as specified in valve Sections.
3. Stems and Stem Guides:
 - a. Materials and Seals: As specified in valve Sections.
 - b. Bronze Valve Stems: According to ASTM B62.
 - c. Space stem guides 8 feet.
 - d. Submerged Stem Guides: Type 304 stainless steel.
4. Nuts and Bolts: As specified in Section 055000 "Metal Fabrications."

2.2 VALVE ACTUATORS

- A. Refer to valve schedule for actuator type.
- B. Provide actuators with position indicators for shutoff valves 6 inches and larger.
- C. Comply with AWWA C542.
- D. Provide chain actuators for shutoff valves mounted 6 feet above floor level.
- E. Provide gear and power actuators with position indicators.
- F. Electric Motor Actuators:
 1. The operator shall be the helical and worm gear type driven by an electric motor. All power gearing shall be Oil Bath lubricated. The actuator shall be in conformance with AWWA C540. The valve manufacturer shall furnish the value of the maximum operating torque required to operate the valve as defined in the Appendix to AWWA C540. The operator manufacturer shall furnish evidence that the operator is designed to equal or exceed the torque requirements.

2. Unless otherwise noted, the operator shall be geared to operate the valve from the fully open position to the fully closed position or vice-versa in approximately 60 seconds for ¼ turn valves, and 12 inches per minute for multi turn valves. It shall be possible to change this cycle time by substituting suitable gear trains. The operator shall be equipped with a declutchable handwheel for manual operation. The operator shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.
3. Suitable reduction gearing shall be provided off the main shaft of the gearing, turning approximately 270 degrees while the valve performs full travel. The reduction gearing shall be equipped with the following position indicating devices for each operator:
 - a. Backlit LCD Display
 - b. The output signal shall be 4-20 ma; a standard potentiometer, 1000 ohms with linearity of +/- 1% for indication in the remote controller;
4. Each operator shall be equipped with adjustable torque switches for overload protection in both opening and closing directions with torque switch bypass for unseating. Torque shall be measured electronically. Torque measurements that rely on motor speed, current, or springs are not acceptable.
5. Each operator shall be equipped with four programmable indication contacts. . The setting accuracy shall be 0.1% of the operator output turns.
6. Each motor shall be 480 volts, 60 Hz, three phase, induction type or 240 volts, 60 Hz, single phase, induction type as designated on the electrical drawings and recommended by the operator manufacturer. Motors shall be designed specifically for actuator service.
7. One (1) thermostat for each phase placed in the windings shall provide the motor with thermal protection. Sensors for multiple phases shall be wired in series. They shall interrupt the control circuit as soon as the temperature goes beyond the permissible winding temperature.
8. Each operator shall be equipped with a reversing magnetic starter. The starter shall be capable of receiving contact closures from remote sources to actuate the operator in either direction. Control voltage shall be 120 volts supplied by a transformer included in the control enclosure. Each operator shall include a local OPEN-STOP-CLOSE control, push button station, and a pad lockable LOCAL-OFF-REMOTE selector switch.
9. All electrical components shall be integral with the operator, housed in a explosion proof NEMA 7 enclosure and completely wired. All enclosures shall be concurrently NEMA 4, 6, and 7 and be rated for submersibility in 60 feet of water for 10 days.
10. Easily identifiable terminal blocks shall be provided for all external power, control, and signal connections.
11. Space heaters, desiccants, breathers and drains of any type are specifically prohibited. The actuator shall have a completely sealed enclosure with separately sealed terminal compartment.

12. Actuators to be provided above grade shall be placed on stainless steel floor pedestals from Trumbull Industries or approved equal. Actuators shall be equipped with vandal resistant covers that protect the actuator from vandalism and unauthorized operation of the actuator.
13. Manufacturers:
 - a. Limitorque
 - b. Rotork

G. Accessories:

1. Handwheel:
 - a. Furnish permanently attached handwheel for emergency manual operation.
 - b. Rotation: None during powered operation.
 - c. Permanently affix directional arrow and cast OPEN on handwheel to indicate appropriate direction to turn handwheel.
 - d. Maximum Operating Force: 60 lbf.

2.3 FINISHES

- A. Valve Lining and Coating: Comply with AWWA C550.
- B. Exposed Valves: As specified in Section 099635 "Chemical-Resistant Coatings."
- C. Do not coat flange faces of valves unless otherwise specified.

2.4 SOURCE QUALITY CONTROL

- A. Testing: Test valves according to manufacturer's standard testing protocol, including hydrostatic, seal, and performance testing.
- B. Certificate of Compliance:
 1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
 2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that piping system is ready for valve installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install valves, actuators, extensions, valve boxes, and accessories according to manufacturer instructions.
- B. Firmly support valves to avoid undue stresses on piping.
- C. Coat studs, bolts, and nuts with anti-seizing lubricant.
- D. Clean field welds of slag and splatter to provide a smooth surface.
- E. Install valves with stems upright or horizontal, not inverted.
- F. Install brass male adapters on each side of valves in copper-piped system and solder adapters to pipe.
- G. Install valves with clearance for installation of insulation and to allow access.
- H. Provide access where valves and fittings are not accessible.
- I. Comply with Division 40 - Process Interconnections for piping materials applying to various system types.
- J. Valve Applications:
 - 1. Install plug valves in vault for diversion flow.
 - 2. Install check valves in vault for EQ basin flow.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Valve Field Testing:
 - 1. Test for proper alignment.

2. If specified by valve Section, field test equipment to demonstrate operation without undue noise, vibration, or overheating.
3. Architect/Engineer will witness field testing.

C. Prepare test and inspection reports.

END OF SECTION 400551

SECTION 400559.23 - STAINLESS STEEL SLIDE GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Stainless steel slide gates.

1.2 DEFINITIONS

- A. Operating Head: Distance from centerline of gate to maximum water level of channel.
- B. UHMW: Ultra-high molecular weight.

1.3 SUBMITTALS

- A. Product Data: Stainless steel slide gates.
- B. Shop Drawings:
 - 1. Indicate system materials and component equipment.
 - 2. Complete description of all materials cross-referenced to a sectional drawing listing material by trade name and ASTM reference number.
 - 3. Certified shop and installation Drawings showing all details of construction, dimensions and anchor bolt locations. Submit installation and anchoring requirements, fasteners, and other details.
 - 4. Descriptive literature, bulletins and/or catalogs of the equipment.
 - 5. The weight of each component.
 - 6. Description of surface preparation and shop prime painting of gates and accessories.
 - 7. Indicate gate identification number, location, service, type, size, design pressure, operator details, stem details, and loads.
 - 8. A listing of all forces transmitted to floor stands if applicable.
- C. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for seating pressure.
- D. Source Quality-Control Submittals: Indicate results of shop tests and inspections.
- E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
- F. Manufacturer Reports:

1. Certify that equipment has been installed according to manufacturer instructions.
2. Indicate activities on Site, adverse findings, and recommendations.

G. Qualifications Statements: For manufacturer, installer, and licensed professional.

H. Manufacturer's Approval: For installer.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of installed slide gates and components.

1.5 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified to NSF Standard 61 and NSF Standard 372.
- B. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years' experience.
- C. Installers Qualifications: Company specializing in performing Work of this Section with minimum three year's experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Provide additional protection according to manufacturer instructions.

1.7 WARRANTY

- A. Furnish one-year manufacturer's warranty for slide gates.
- B. Furnish one-year manufacturer's warranty that clear plastic stem covers will not crack, discolor, or become opaque.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seating & Unseating Pressures:
 - 1. See Slide Gate Schedule on Drawings.
 - 2. Measurement: From maximum water surface to centerline of gate.
- B. Minimum Vertical Loading: 50 percent of force on the gate from operating head acting on horizontal centerline of gate, multiplied by effective gate area, plus weight of slide and stem.
- C. Gate Reinforcement: As required for deflection not greater than 1/360 of span.
- D. Operating Head:
 - 1. Safety Factor: Design gate to operate under specified operating head with safety factor of five.

2.2 STAINLESS STEEL SLIDE GATES

- A. Manufacturers:
 - 1. RW Gate Company
 - 2. Rodney Hunt
 - 3. Or Approved Equal
- B. Self-contained stainless steel slide gate with extended frame, yoke, lifting stem attached to yoke, lift and lift support, stem, stem guide, and stem block.
- C. Non-self-contained stainless steel slide gate with limited frame, lifting stem, lift and lift support, stem, stem guide, and stem block.
- D. Comply with AWWA C561.
- E. Size: As indicated on Drawings.
- F. Operating Head: As indicated in schedule on Drawings.
- G. Closure: Conventional.
- H. Opening: Upward.
- I. Gates:
 - 1. Material: Type 304 stainless steel.

2. Minimum Thickness: ¼ inch.
3. Size: As indicated on Drawings.

J. SLIDE

1. The slide shall consist of a stainless steel plate that is reinforced with stiffeners to withstand the specified head conditions. The slide shall engage the frame a minimum of 1-inch on each side.
 - a. The slide shall be reinforced with plates or channel shaped members to restrict deflection to 1/16-inch or less at the design head.
 - b. The stiffeners shall be welded to the slide plate in the horizontal and vertical positions.
 - c. The portion of the slide that engages the frame shall have a minimum thickness of 1/2-inch.
 - d. On rising stem gates, a stem connector shall be welded to the slide as a means of connecting the operating stem. The bottom portion of the stem shall be affixed to the stem connector with a minimum of two attachment bolts.

K. FRAME

1. The frame shall be constructed of stainless steel plate, with the guide section formed into a C channel shape or similar to house the seal, and shall be reinforced to withstand the specified operating conditions.
 - a. The guides shall be of a one-piece design with gussets that extend along the outside and top to accommodate unseating head. The guide members shall incorporate a tubular cross section along the guides for additional rigidity. Two-piece, sandwich type guides that are bolted together are not acceptable.
 - b. The mounting configuration of the frame shall be as shown on the Contract Drawings.
 - c. Wall mounted frames shall be of the flanged frame type. Flat frames shall only be provided on gates with frames that will be embedded in the concrete wall or mounted inside existing channels.
 - d. The guide portion of flanged frame gates shall have a minimum weight of 13 lbs/ft. The guide portion of the flanged frame, where the anchors penetrate, shall have a minimum thickness of 1/2-inch.
 - e. The guide extension portion of the frame shall have a minimum weight of 6 lbs/ft. Angles are not considered acceptable guide extensions.
 - f. Lifting lugs shall be provided on all frame styles.
 - g. On self-contained gates, the side frame shall extend above the operating floor and the operating mechanism shall be mounted to the yoke. When shown, the frame may extend to or below the operating floor and a floorstand may be mounted on the yoke.
 - h. Yoke members shall be C channel shaped structural members. Angles are not considered acceptable yoke members.

L. SEALS

1. The seal system shall consist of self-adjusting UHMWPE seals with a nitrile or EPDM compression cord.
 - a. The UHMWPE seals shall be arranged to ensure that there is no metal-to-metal contact between the slide and frame.
 - b. The compression cord shall be contained by the UHMWPE seal so that it shall not be in contact with the slide.
 - c. Seal system shall be self-adjusting for the life of the gate. Adjustable wedging devices such as wedges, wedge bars and pressure pads are not acceptable.
 - d. On upward-opening gates, rubber side seals and/or top seals such as J-bulb seals or similar rubber seals are not acceptable in lieu of UHMWPE seals.
 - e. On downward opening gates, rubber side seals and/or invert seals such as J-bulb seals or similar rubber seals are not acceptable in lieu of UHMWPE seals.
 - f. The invert seal on upward opening gates shall use a compressible EPDM seal located in the invert of the frame.
 - 1) The invert seal shall be of a flush bottom arrangement.
 - 2) The invert seal shall be mechanically fastened with stainless steel bolts.
 - 3) Invert seals attached solely by the use of adhesives are not acceptable.
 - g. All seats and seals shall be secured with assembly bolts. All seals shall be field removable and field replaceable without the need to remove the gate frame from the wall. Gates that require disassembly of any portion of the frame, to replace seals, are unacceptable.
 - h. Anchor bolts shall not penetrate the seats or seals and anchor bolts shall not prevent the removal or replacement of seats or seals.
 - i. The seal system shall have been shop tested with a minimum 30,000 cycle operating test in an abrasive environment to confirm the ability of the seals to withstand the abrasive condition with negligible deterioration and to confirm that the leakage restriction requirement is still possible.
 - 1) The shop test shall have been performed on a stainless steel sluice gate and the test results shall have been certified by the manufacturer in writing.
 - 2) A copy of the test shall be provided to the Engineer.

M. OPERATING STEM

1. The operating stem shall be of stainless steel and shall be designed to transmit in compression at least 2 times the rated output of the manual operating mechanism with an 80 lbs effort.
2. The stem shall have a slenderness ratio (L/r) less than 200.

3. The threaded portion of the stem shall have a minimum diameter of 1-1/2 inches.
 - a. The threads shall have machine rolled, full depth ACME threads.
 - b. Stub threads are not acceptable.
4. Stems provided in multiple pieces shall be provided with couplings.
 - a. Couplings shall be bronze or stainless steel and shall be internally threaded and keyed or bored and bolted.
5. Stem guides shall be constructed of stainless steel with UHMWPE bushings.
6. Gates with rising stems shall be provided with a clear plastic stem cover.
 - a. The stem cover shall be butyrate and shall have a cap and condensation vents.
 - b. Clear mylar indicating tape shall be provided for field application after the gate has been installed and positioned.
7. Stop collars shall be provided to limit the downward travel on gates with manual operating mechanisms.
 - a. Stop collars shall be bronze and shall be internally threaded and provided with a stainless steel set screw.

2.3 FINISHES

- A. Stainless Steel Surfaces: Mill finish.

2.4 ACCESSORIES

- A. Hardware: Type 304 stainless steel.

2.5 SOURCE QUALITY CONTROL

- A. Inspection and Testing:

1. Provide shop inspection and testing of completed assemblies.
2. Comply with AWWA C561.

- B. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that facilities are ready to receive slide gates.

3.2 PREPARATION

- A. Clean adjacent surfaces according to manufacturer instructions.

3.3 INSTALLATION OF STAINLESS STEEL SLIDE GATES

- A. According to manufacturer instructions.
- B. Ensure that products are installed plumb, true, and free of warp or twist.
- C. Locate operators to avoid interference with handrails and other Work.
- D. Guides:
 1. Surface and Flange Mounting:
 - a. Install guides with expansion anchors.
 - b. Position guides at elevation as indicated on Drawings.
 2. Recess Mounting:
 - a. Cut slot in concrete to receive guides.
 - b. Position guides at elevation as indicated on Drawings.
 - c. Grout guides in place according to manufacturer instructions.
- E. Sealant:
 1. Apply 1/8-inch-thick layer of elastomeric sealant to back of frame.
 2. Tighten nuts snug until sealant begins to flow beyond frame.
 3. Remove excess sealant.
 4. Cure sealant for minimum seven days.
 5. Tighten nuts to their final positions.
- F. Lubricants: Provide oil and grease as required for initial operation.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Verify alignment of gate and components.
2. Verify that gate operates smoothly and does not bind or scrape.

B. Testing:

1. Comply with AWWA C561.
2. Leakage: Not exceeding 0.05 gpm/ft. or under of seating perimeter of seating head and not exceeding 0.05 gpm/ft. or under of unseating head.

C. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than one day on Site for installation, inspection, field testing, and instructing Owner's personnel in maintenance of equipment.

D. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and re-inspect.
2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

3.5 ADJUSTING

A. Adjust slide gates to provide smooth operation.

3.6 DEMONSTRATION

A. Demonstrate equipment operation, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 400559.23

SECTION 400562 - PLUG VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Eccentric plug valves.

PART 2 - PRODUCTS

2.1 ECCENTRIC PLUG VALVES

A. Manufacturers:

1. Val-Matic.
2. Dezurik.
3. Or approved equal.

B. Description:

1. As specified in Section 400551 "Common Requirements for Process Valves."
2. Type:
 - a. Non-lubricated.
 - b. Eccentric.
3. Ports:
 - a. Configuration: Round.
 - b. Minimum Port Area: 100 percent pipe area.
4. Stem Bearings: Self-lubricating.
5. Stem Seals:
 - a. Type: V-ring.
 - b. Material: Neoprene.
6. Packing and Gland: Accessible and externally adjustable.
7. End Connections:
 - a. Flanged: Comply with ANSI 125.
8. Valve pressure ratings shall be 175 psi through 12 inches and 150 psi for valves over 12 inches.

C. Operation:

1. As specified in Section 400551 "Common Requirements for Process Valves" and in the valve schedule.

2. Electrically actuated.
3. Furnish gear operators for valves 8 inches and larger.

D. Materials:

1. Body:
 - a. Cast iron, AWWA C517.
 - b. Lining: Elastomer, as recommended by valve manufacturer for service conditions.
2. Plug:
 - a. Cast iron, AWWA C517.
 - b. Lining: Resilient coating, as recommended by valve manufacturer for service conditions.
3. Seats: Nickel
4. Stem: Type 316 stainless steel
5. Stem Bearings: Stainless steel
6. Seals: PTFE.
7. Connecting Hardware: Type 316 stainless steel.

E. Finishes: As specified in Section 400551 "Common Requirements for Process Valves."

2.2 SOURCE QUALITY CONTROL

- A. As specified in Section 400551 "Common Requirements for Process Valves."
- B. Testing: Test gate valves according to AWWA C509.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. According to AWWA C517.
- B. Horizontal Piping: Stem horizontal.
- C. Vertical Piping: Plug at top when closed.
- D. Plugs: On top when open and on pressure side when closed.

END OF SECTION 400562

SECTION 400565.23 - SWING CHECK VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Swing check valves.

1.2 COORDINATION

- A. Coordinate Work of this Section with piping and equipment connections as specified in other Sections.

1.3 SUBMITTALS

- A. Product Data: Swing check valves.
- B. Source Quality-Control Reports: For swing check valves.
- C. Field Quality-Control Reports: For swing check valves.
- D. Qualifications Statement: For manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and invert elevations.

1.5 QUALITY ASSURANCE

- A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.
- B. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Protect valves and appurtenances by storing off ground.
 - 3. Provide additional protection according to manufacturer instructions.

1.7 WARRANTY

- A. Furnish one-year manufacturer's warranty for resilient, flexible disc check valves.

PART 2 - PRODUCTS

2.1 SWING CHECK VALVES

A. Manufacturers

1. Valmatic, Swing-Flex
2. Or approved equal.

B. Description:

1. The valve body shall be full flow equal to nominal pipe diameter at all points through the valve. The 4 in. valve shall be capable of passing a 3 in. solid.
2. The seating surface shall be on a 45 degree angle to minimize disc travel.
3. A threaded port with pipe plug shall be provided on the bottom of the valve to allow for field installation of a backflow actuator or oil cushion device without special tools or removing the valve from the line.
4. The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content. A threaded port with pipe plug shall be provided in the access cover to allow for field installation of a mechanical, disc position indicator.
5. The disc shall be of one-piece construction, precision molded with an integral O-ring type sealing surface and reinforced with alloy steel. The flex portion of the disc contains nylon reinforcement and shall be warranted for twenty-five years.
6. Non-Slam closing characteristics shall be provided through a short 35 degree disc stroke and a memory disc return action to provide a cracking pressure of 0.25 psig.
7. The valve disc shall be cycle tested 1,000,000 times in accordance with ANSI/AWWA C508 and show no signs of wear, cracking, or distortion to the valve disc or seat and shall remain drop tight at both high and low pressures.
8. A screw-type backflow actuator shall be provided to allow opening of the valve during no-flow conditions. Buna-N seals shall be used to seal the stainless steel stem in a Lead-Free bronze bushing. The backflow device shall be of the rising-stem type to indicate position. A stainless steel T-handle shall be provided for ease of operation.
9. A mechanical indicator shall be provided to provide disc position indication on valves 3" and larger. The indicator shall have continuous contact with the disc under all operating conditions to assure accurate disc position indication.

C. Materials

1. The valve body and cover shall be constructed of ASTM A536 Grade 65-45-12 ductile iron or ASTM A126 class B gray iron for 30 in. and larger.
2. The disc shall be precision molded Buna-N (NBR), ASTM D2000-BG.

- D. Finishes: As specified in Section 400551 "Common Requirements for Process Valves."

2.2 SOURCE QUALITY CONTROL

A. Testing:

1. Hydrostatically test check valves at twice rated pressure according to AWWA C508.
2. Permitted Leakage at Indicated Working Pressure: None.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that field dimensions are as indicated on Drawings.
- B. Inspect existing flanges for nonstandard bolt-hole configurations or design, and verify that new valve and flange mate properly.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Thoroughly clean valves before installation.
- B. Surface Preparation:
 1. Touch up shop-primed surfaces with primer as specified in Section 099635 "Chemical-Resistant Coatings."
 2. Solvent-clean surfaces that are not shop primed.
 3. Clean surfaces to remove loose rust, mill scale, and other foreign substances by commercial sand blasting; SSPC SP 6.
 4. Prime surfaces as specified in Section 099635 "Chemical-Resistant Coatings."

3.3 INSTALLATION

- A. According to AWWA C508 and manufacturer instructions.
- B. Dielectric Fittings: Provide between dissimilar metals.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Inspection:
 1. Inspect for damage to valve lining or coating and for other defects that may be detrimental as determined by Architect/Engineer.
 2. Repair damaged valve or provide new, undamaged valve.
 3. After installation, inspect for proper supports and interferences.
- C. Pressure Testing: As indicated in piping schedule.
- D. Prepare test and inspection reports.

3.5 CLEANING

- A. Keep valve interior clean as installation progresses.
- B. After installation, clean valve interior of soil, grit, loose mortar, and other debris.

END OF SECTION 400565.23

SECTION 406196 - FUNCTIONAL NARRATIVES

This Section includes the basic equipment programming to be performed by the Project Systems Integrator.

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Description of the Process Instrumentation and Control.

1.2 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control Systems.
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
- C. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

- A. Submit under provisions of Section 013323 – Shop Drawings, Product Data and Samples.
- B. Product Data: Include list which indicates use, operating range, total range and location for manufactured components.
- C. Submit manufacturer's installation instructions.

1.4 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 017839 – Project Records, Drawings.
- B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish Products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 - PRODUCTS

2.1 SYSTEM INTEGRATOR

- A. Protech System Group
123 E. Waterloo Road
Akron, Ohio 44319
330-773-9828

2.2 PROCESS COMPONENTS

- A. This specification provides the description of controls for various process conditions.
 - 1. 2.4 A – Normal Operation
 - 2. 2.4 B – Tank Filling Operation
 - 3. 2.4 C – Tank Full Operation
 - 4. 2.4 D – Tank Draining Operation
 - 5. 2.4 E – Filling from Plains Road Pump Station Force Main
 - 6. 2.4 F – FLOAT Mode
- B. The following set of control descriptions shall be incorporated in the SCADA System designed and provided by the System Integrator. These descriptions have been prepared based on specified equipment. The System Integrator shall modify this document as required to accommodate actual approved equipment shop drawings.
- C. The System Integrator shall provide control, by means of an HMI screen, within the Control Building at the Lakeshore East EQ Basin site and within the SCADA system at the Willoughby/Eastlake WWTP.
- D. All elevation set points shall be field programmable.
- E. Each operation mode shall be automated and a selector button on the HMI shall be provided to initiate.

2.3 GENERAL REQUIREMENTS

- A. AUTOMATIC / REMOTE / LOCAL CONTROL SWITCHES, INDICATING LIGHTS AND TRENDING
 - 1. The requirements listed here shall be adhered to for all motor operated devices controlled by the SCADA System unless specifically stated otherwise elsewhere in this specification. Motor operated devices shall be equipped with locally mounted switches that provide “HAND-OFF- AUTO” (HOA) capability.

2. The “AUTO” position shall allow operation through SCADA. The “HAND” position shall allow local operation of the device. The “OFF” position shall disable all operation of the device. In addition, “START-STOP” controls shall be mounted locally on all motor operated devices. Additional local controls such as “FORWARD-REVERSE”, if required, will be identified with the control requirements of the specific device.
3. All devices controlled by SCADA shall have locally mounted indicating lights that identify the status of the device such as open/closed or on/off.
4. All devices controlled by SCADA shall have their run status monitored and total run time recorded through hardwired totalizers located in their respective controllers as well as the SCADA PLC. The SCADA HMI will be able to trend any tag in the PLC.

B. GENERAL OPERATING

Control Mode

HAND

The operator can manually start and stop the pumps as desired at the local device. While in Hand Mode, the PLC will not have control. The operator can manually open and close valves and gates with the PLC and at the actuator.

AUTO

With the H/O/A selector switch in the Auto position the PLC will operate the respective device as needed. The PLC will maintain automatic alternation of the existing pumps to equalize run times. The PLC will operate the valves in an open and close fashion. The PLC will automate the operation of the slide gates with an analog signal proportional to the percent open desired. The percent open shall be field adjustable. The PLC will operate the center flush system with the completion of a draining the tank.

Alarm Summary

- Valve Fault
- Regulator Structure High Water
- Wet Well High Water
- EQ Basin High Water
- Pump Fault
- High Torque Overload Fault
- Thermal Overload Fault
- Center Flush System Fault
- Generator Fault

Monitoring Parameters

- Valve running modes (Auto/Man)
- Valve Positions (Open/Closed)
- Gate running modes (Auto/Man)
- Gate Position Indicator (% Open)

- Pump running statuses
- Wet Well level (% full or feet)
- Wet Well float switch statuses
- Regulator Structure Level (% full or feet)
- Center Flush High Water Level
- Generator Running

Control Points

- Valve Open/Close commands
- Gate Position commands
- Pump Run commands
- Center Flush commands

Summary of Settings

- Pumps Off, Lead Pump On, Lag Pump On, High Water Alarm

2.4 DESCRIPTIONS

- Refer to contract drawings for valve tag locations (LEGV-1, etc.)

A. NORMAL OPERATION

Description

The Normal Operation of the Lakeshore East EQ Basin includes no flow entering the wet well or Lakeshore East EQ Basin. Sewer flow passes through the Regulator Structure within the sewer. Plains Road pump station would pump directly to the Plains Road Siphon.

Slide gate LESG-1 is open, LESG-2 is closed, located within the Regulator Structure. LESG-3 is open and LESG-4 is open, located within the wet well. LEPV-6 and 7 open with LEPV-5 closed, located within the Diversion Structure.

B. TANK FILLING OPERATION

Description

The Filling Operation of the Lakeshore East EQ Basin initiates when flow within the Regulator Structure begins to over top the weir, diverting flow to the wet well. The level sensor in the Regulator Structure will continuously monitor the level, signaling to operate in the Filling Operation once the water level within the Regulator Structure reaches the weir elevation.

Slide gate LESG-1 is open, LESG-2 is closed, located within the Regulator Structure. LESG-3 is open and LESG-4 is open, located within the wet well.

At elevation 592.13' within the Lakeshore East EQ Basin, LEGS-4 closes, pump operation

begins.

The level in the Wet Well will be constantly monitored by the level sensor and will cycle the pumps on and off as needed in a lead/lag fashion as the water level reaches the respective set points. If the level sensor fails, level control will shift to float switches installed at fixed elevations within the Wet Well.

Pumps will shutoff at “All Pumps Off” level or if the High Water Alarm for the EQ Tank is triggered.

C. TANK FULL OPERATION

Description

The Tank Full Operation of the Lakeshore East EQ Basin is initiated when the water surface elevation within the EQ Basin is at the high water level. The level sensor in the East EQ Basin will continuously monitor the level, signaling to stop pumps once the high water level has been reached. The water level within the Regulator Structure will also be continuously monitored.

Slide gate LESG-1 is open, LESG-2 is closed, located within the Regulator Structure. LESG-3 is closed and LESG-4 is closed, located within the wet well.

D. TANK DRAINING OPERATION

Description

The Tank Drain Operation of the Lakeshore East EQ Basin is initiated when the water surface elevation within the Regulator Structure drops to the Regulator Low Water Level. The level sensor in the Regulator Structure will continuously monitor the level, signaling to initiate a tank drain once the Regulator Low Water Level has been reached. The water level within the Lakeshore East EQ Basin will be continuously monitored.

The Lakeshore East EQ Basin will drain by gravity with no pump operation. Slide gate LESG-1 is open, LESG-2 is open, located within the Regulator Structure. LESG-3 is open and LESG-4 is open, located within the wet well. Once the tank is drained, the center flush will be initiated.

When draining of the Lakeshore East EQ Basin is complete, LESG-4 will close and the system will return to Normal Operation.

E. FILLING FROM PLAINS ROAD PUMP STATION FORCE MAIN OPERATION

Description

The Filling From Plains Road Pump Station Force Main Operation of the Lakeshore East EQ Basin includes flow being diverted from the Diversion Structure to the Lakeshore East EQ Basin. The EQ Basin water level will be continuously monitored.

Slide gate LESG-1 is open, LESG-2 is closed, located within the Regulator Structure.

LESG-3 is closed and LESG-4 is closed, located within the wet well. LEGV-6 is closed in the Diversion Structure. LEPV-5 and LEPV-7 are open in the Diversion Structure.

F. FLOAT MODE OPERATION

Description

Float Mode Operation provides a means to monitor and control the level of the Wet Well by float switches fixed at certain levels in lieu of continuous monitoring.

END OF SECTION 406196

SECTION 409123.39 - LEVEL SENSORS AND TRANSMITTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. This section includes furnishing and installing level type sensors and transmitters. This Section also includes the furnishing of necessary start-up services and training of plant operating personnel in operation and maintenance of the equipment.
- B. It is the intent of this contract that the final installation shall be complete in all respects and the Contractor shall be responsible for minor details and any necessary special construction not specifically included in the Drawings or Specifications.

1.3 QUALITY ASSURANCE

- A. All work performed under this section shall comply and be in accordance with all approved trade practices and manufacturer's recommendations.

1.4 STANDARDIZATION

- A. All equipment shall be of the latest and most modern design. All sensor/transmitter assemblies, of the same type, shall be of the same manufacture and general model type.

1.5 SUBMITTALS

- A. The level sensor and the level transmitter shall have an identifying tag (white plastic with black letters engraved on it) mounted on each piece of equipment with the following information:
 - 1. Manufacturer's name
 - 2. Part number
 - 3. Serial number
 - 4. Tag number
 - 5. Calibrated range

PART 2 - PRODUCTS

2.1 LIQUID LEVEL SENSOR

- A. Furnish radar sensor for non-contact, continuous level measurement designed for wastewater applications as manufactured by Vega, model VEGAPULS C21.
- B. The level transmitter shall be UL/cUL certified intrinsically safe for installation in hazardous locations.
- C. The radar sensor shall be maintenance free operation due to non-contact 80 GHz radar technology with an measurement deviation of 2 mm or less.

- D. Measuring range up to 65 ft.
- E. Sensor shall be polyvinylidene fluoride construction with fluorocarbon rubber process seal. 4-20 mA signal.
- F. Housing shall be IP66/IP68 rated.

2.2 FLOAT SWITCH

- A. Furnish a microswitch with switching ball constructed of polypropylene, as manufactured by Endress and Hauser – FTS20, or approved equal.

PART 3 - EXECUTION

3.1 MANUFACTURER'S SERVICES

- A. The level sensor and transmitter manufacturer shall provide the services of a qualified service engineer to supervise and inspect the equipment installation to insure that it is installed in accordance with the manufacturer's recommendations.
- B. The manufacturer's service engineer shall field calibrate all equipment specified under this section. This service shall be performed at the request of the Project Engineer at the time of complete plant start-up at the end of the last construction contract. A calibration certificate shall be submitted to the Project Engineer for each piece of equipment. The service engineer shall also make all adjustments necessary to place the equipment in trouble-free operation. In addition, the equipment manufacturer shall provide a qualified manufacturer's service engineer to train the plant operating personnel in the proper care, repair, calibration and operation of the equipment. This service shall be provided at the location and time requested by the Owner.

3.2 INSTALLATION

- A. The sensor installation shall be isolated from vibration and possible physical damage. It shall not be mounted in the direct stream of process fluid. The sensor shall be easily removable for cleaning or maintenance.
- B. The sensor shall be wired using a manufacturer's recommended flexible cable to a junction box close to the probe to facilitate withdrawal of the probe for maintenance. The wiring from the junction box to the transmitter shall be done using manufacturer's recommended wires and rigid conduit.

3.3 OPERATION AND MAINTENANCE MANUALS

- A. Prior to or with the delivery of equipment, the manufacturer shall provide copies of an operation and maintenance manual including storage, installation, start-up, operating and maintenance instructions, and a complete parts list and recommended spare parts list. The O & M Manuals shall be in compliance with the General Requirements.

END OF SECTION 409123.39

SECTION 432139 - SUBMERSIBLE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes non-clog submersible pumps.
- B. Related Requirements:
 - 1. Division 26
 - 2. 406700 – Common System Equipment Panels and Racks

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications Sections, apply to work of this section.

1.3 REFERENCES

- A. ASTM A-48 Standard Specification for Gray Iron Castings.
- B. IEEE Std 112 Standard Test Procedure for Polyphase Induction Motors and Generators.
- C. NEC Article 500 Hazardous (Classified) Locations.
- D. NEMA MG-1 Motors and Generators.
- E. SSPC SP-1 Solvent Cleaning.
- F. SSPC SP-10 Near-White Blast Cleaning

1.4 SUBMITTALS

- A. Product Data: Submit summary listing the following information:
 - 1. Manufacturer: pump and motor
 - 2. Pump: weight
 - 3. Casing: Material
 - 4. Motor jacket: material
 - 5. Casing bolts and nuts: material
 - 6. Impeller: material, design and coating
 - 7. Wear ring: number, location and material
 - 8. Shaft: material, diameter, and length

9. Mechanical Seals: type, upper and lower seal material, spring material, O-ring material.
10. Motor: type, NEC Article 500 rating, insulation class, service factor, continuous duty ambient temperature, starts per hour
11. Thermal switches: number and temperature rating
12. Float switch: type, material
13. Coatings: primer type, finish type, number of coats, total dry film thickness, suitability for media being pumped
14. Guide system: type, size, material
15. Pressure gauges
16. Minimum submergence and NPSH required at all design points
17. Spare parts: number and type
18. Motor controls including enclosure, circuit protection, disconnects, starters, transformers, phase monitor, switches, relays and contacts, lights, meters, timers, alternators, strip heater, alarms, and fuses.

B. Shop Drawings:

1. Dimensions of pumps, discharge and guide system.
2. Plan view of pump indicating clearances required for hatch openings.
3. Pump layout, spacing requirements
4. Motor control ladder diagram.

C. Quality Control:

1. Design Data

- a. Pump performance curves showing head, capacity, speed, efficiency, NPSH required, and brake horsepower required.
- b. The pump manufacturer shall submit a copy of the pump's L^3/D^4 calculation.
- c. The pump manufacturer shall submit a copy of the B-10 bearing life calculation for the bearings to be furnished with the pump.

2. Test Reports

- a. Five (5) certified copies of all hydrostatic and performance tests on both pump and motor.

3. Installation Report

- a. The equipment manufacturer shall also submit a written report stating the following:
 1. Is properly installed
 2. Is in accurate alignment
 3. Is properly lubricated
 4. Has been tested and operated satisfactorily.

1.5 WARRANTY

- A. Furnish one-year manufacturer's warranty for pumps and accessories.

PART 2 – PRODUCTS

2.1 SUBMERSIBLE PUMPS

- A. Manufacturer:
 - 1. Flygt
 - 2. Or Approved Equal
- B. Vertical, non-clog submersible pumps
- C. Pump Housing: Cast iron, comply with ASTM A48/A48M, Class 35B.
 - 1. Construction: Heavy duty, with replaceable suction piece or suction liner constructed of ASTM A48 cast iron.
- D. Impeller and Insert Ring: Cast iron, comply with ASTM A48/A48M, Class 35B.
 - 1. Statically and dynamically balanced.
 - 2. Semi open, multi-vane, back swept, screw-shaped, non-clog design.
 - 3. Impeller leading edges shall be mechanically self-cleaned automatically.
 - 4. The spiral groove shall provide trash release pathways and sharp edges across which each impeller vane leading edge shall cross during rotation to remain unobstructed.
 - 5. The insert ring shall be cast of ASTM A-532 (Alloy IIIA) 25% chrome cast iron and provide effective sealing between the multi-vane semi-open impeller and the volute housing.
- E. Shaft: 416 Stainless Steel.
- F. Bearings
 - 1. Minimum L-10 life: 100,000 hours at continuous maximum load and speed, according to ABMA 11.
- G. Mechanical Seal
 - 1. Two independent, tandem mounted face type.
 - 2. Pump side: Corrosion resistant Tungsten carbide.

3. Motor Side: Carbon – Corrosion resistant Tungsten carbide.

H. Motor:

1. Submersible motors shall successfully operate under power supply variations per NEMA MG1-14.30. Motors shall be NEMA Design B with torque and starting current in accordance with NEMA MG-12. The submersible motors shall be of an air-filled, high efficiency design with copper windings and shall be rated for continuous full load operation. The motor construction shall be of explosion proof, TENV-TEXP design and capable of being certified for use in Class 1, groups C & D hazardous locations.
2. Motor shall be capable of withstanding up to 15 starts per hour and shall have a minimum of 1.15 service factor.
3. The insulation system shall be Class F certified per IEEE 117 and rated at temperature 1550 C. At least two (2) normally closed, automatic reset, thermostats shall be connected in series and embedded in adjoining phases of the stator windings.

I. Sensors:

1. Motor over temperature shall be provided by three thermal switches embedded in the stator lead coils. The thermal switches shall monitor the temperature of each phase winding and shall be set to open at 125°C.
2. A dual (2) probe sensing system shall be provided to detect the presence of moisture within the motor. The moisture sensing probe leads shall terminate at a separately supplied conductance relay located in the control panel which shall provide an alarm in the event of moisture intrusion. The sensing relay shall either be provided or approved by the pump/motor manufacturer.
3. The thermal switches and moisture sensor shall be connected to a Mini CAS control and status monitoring unit. The Mini CAS unit shall be designed to be mounted in the Motor Control Center.

J. Cable/ Cable entry:

1. The power and control cable entry system shall be designed to provide a positive, leak-free seal to prevent liquid from entering the air filled motor housing. The design shall incorporate provisions which prevent moisture from wicking through the cable assemble even in the event that the cable jacket has been punctured. All cable shall be type SEOW-A and U.L. listed for for the intended submersible service.
2. The power and control cable entry into the lead connection chamber shall be encapsulated for positive moisture sealing. A Buna-N cable grommet shall be provided in addition to the epoxy sealed leads. Compression type grommet fittings employed as the primary sealing system shall neither be considered

equal or acceptable. Separate power and control cables shall be provided to prevent false sensor warnings

2.2 DISCHARGE COUPLING

- A. Each pump shall be connected to the discharge line by means of a quick-disconnect sealed flange mounted on the pump and the outlet line. Fittings shall be such that sealing is accomplished by a metal-to-metal watertight contact without bolts, fasteners, or extreme force.
- B. The base elbow shall be manufactured to the same materials as the pump casing. All cast materials shall have smooth surfaces, free from blowholes, sand holes, and other faults.
- C. The discharge base elbow shall be anchored to the floor of the wet well with type 304 stainless steel anchor bolts. Anchor bolt type, style, and size shall be as recommended by the pump manufacturer for the type of foundation specified or shown on the drawings.

2.3 GUIDE SYSTEM

- A. The pumps shall come complete with sliding brackets, adequately braced type 304L Stainless Steel schedule 40 pipe guard rail, stainless steel pull chains reaching ground level.

2.4 PAINTING

- A. All surfaces shall be cleaned of dirt, grease, oil, rust, scale or other injurious substances. All ferrous metal surfaces shall be prepared in accordance with SSPC-SP-10. Non-ferrous metal surfaces shall be prepared in accordance with SSPC-SP-1.
- B. All metal surfaces that will be partially or wholly submerged shall receive a factory (shop) applied finish paint system. The paint system shall be applied in accordance with the manufacturers recommendations, be applied in at least two coats and have a total dry film thickness not less than 10 mills. Paint systems shall be specifically suited and designed for use in the media being pumped.
- C. Manufactures:
 - 1. Sherwin-Williams
 - 2. Tnemec Company, Inc.
 - 3. Carboline

2.5 ACCESSORIES

- A. Each pump shall be provided with easily identifiable terminal points to facilitate the exchange of the central control functions between the pumps and the process control system as indicated on the Drawings.
- B. Each set of pumps shall be provided with one set of special tools required for complete service and maintenance.
- C. Spare Parts:
 - 1. Each pump shall be provided with one spare set of spare parts as recommended by the pump manufacturer. Any special tools required for maintenance shall be supplied with each pump.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. The equipment shall be installed in accordance with the manufacturer's recommendations.
- B. Provide and connect piping, power and control conduit, and wiring to make system operational and ready for startup.

3.2 INITIAL LUBRICATION

- A. Initial lubrication required for startup and field test operation shall be furnished and applied in accordance with the manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

- A. Preoperational Check: Before operating system or components, perform following:
 - 1. Check pump and motor alignment.
 - 2. Check for proper motor rotation.
 - 3. Check pump and drive units for proper lubrication.
- B. Startup and Performance Testing:
 - 1. Operate pump on clear water at design point for continuous of two hours, under supervision of manufacturer's representative.
- C. Verify pump performance by performing time-drawdown test or time-fill test.
- D. Check pump and motor for high bearing temperature an excessive vibration according to manufacturer instructions. Check for motor overload by taking ampere readings.

E. Equipment Acceptance:

1. Adjust, repair, modify, or replace system components that fail to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

3.4 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance (O&M) manuals shall be provided prior to or with the delivery of the equipment. The O & M manuals shall include instructions on storage, installation, start-up, and operation and maintenance, together with a complete parts list and a recommended spare parts list. The O & M manuals shall be in compliance with the General Requirements.

END OF SECTION 432139

SECTION 464614 – CIRCULAR TANK FLUSHING SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Contractor shall furnish all labour, materials, required to install the circular tank flushing system described in this Section.

1.2 SUBMITTALS

- A. Product Data:
 - 1. Circular tank flushing system
- B. Shop Drawings:
 - 1. General catalogue data and/or marketing literature.
 - 2. Installation instructions.
 - 3. Operating characteristics
 - 4. Operating instructions with troubleshooting section.
 - 5. Maintenance instructions.
 - 6. Spare parts list
 - 7. Approval documents
- C. Source Quality-Control Reports: For magnetic flow meters and accessories.
- D. Field Quality-Control Reports: For magnetic flow meters and accessories.
- E. Qualifications Statement: For manufacturer.

1.3 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations and final orientation of equipment and accessories.

1.4 QUALITY ASSURANCE

- A. Ensure that materials of construction of wetted parts are compatible with process liquid.
- B. Manufacturers Qualifications: Company specializing in manufacturing products specified in this Section with minimum five years' of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store equipment according to manufacturer instructions.
- C. Protection:
 - 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 - 2. Provide additional protection according to manufacturer instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Gabriel Novac & Associates Ltd., Hydrosel Self Circular System
- B. Or approved equal.

2.2 SYSTEM DESCRIPTION

- A. The circular tank flushing system is used to effectively clean the circular tank bottom in one flush and opens upon command in order to relieve the flush water stored. The system is completely self-contained and uses the influent flow for flushing the tank effectively.
- B. The circular tank flushing system can be used either manually or automatically. Once the circular tank flushing system is released, the system returns to its standby mode.
- C. The equipment manufacturer shall provide all special tools and materials necessary to install the circular tank flushing system. The equipment shall include and be limited to the following:
 - 1. Circular tank flushing system shall be powered by two (2) double acting stainless hydraulic cylinders with flow distribution control.
 - 2. The circular tank flushing system will be connected to the control panel/hydraulic power pack using two (2), ½" diameter, PVC coated, stainless steel hydraulic tubing, including all the connectors and anchors required to support the hydraulic lines.
 - 3. One (1) control panel with a 24V- UPS power supply; one (1) hydraulic power pack, containing one (1) pump, one (1) motor, one (1) oil pressure buffer, one (1) quadruple ported solenoid valve, one (1) double ported, single acting, normally open solenoid operated dump valve, one (1) adjustable pressure relief valve, oil

level, temperature and pressure indicator gauge, electronic low level, high temperature and low pressure signal, complete with water level indicators which are operated through intrinsically safe relays and allow for the flushing circular system start and stop.

4. The control panel/hydraulic power pack is equipped with one (1) key operated selector switch for MANUAL/OFF/AUTO operation, an emergency stop button, indicator lights on system conditions and pushbuttons to control the system operation. In manual mode the circular tank flushing system, controlled by the control panel/hydraulic power pack may be operated at will, regardless of water level conditions.
5. Water level indicators in the flushing cylinder and in the sump, which will control the operation of the circular tank flushing system, will be used.
6. The filling level of the Circular cylinder is indicated at the control panel.

2.3 CIRCULAR TANK FLUSHING SYSTEM

- A. Each circular tank flushing system shall be fabricated entirely of 304 L stainless steel equipped with brass bushings for the hinges and locking mechanism. The central column of the circular shall be anchored using (16) M16 chemical anchors entirely of stainless steel 316. All welds shall be done using the MIG process and all full penetration welds shall be continuous. This shall be verified in the shop. All welds shall be sized to withstand the design operating static and dynamic loads experienced under normal operating conditions.
- B. The vertical movement mechanism shall be designed to withstand all operational forces, to allow for full vertical travel of at least 10" (from circular flushing system fully open to circular flushing system fully closed). The closed set-point shall be adjustable. Material for lifting mechanism shall be 304 L stainless steel and bronze only. The locking mechanism shall be constructed entirely of 304 L stainless steel and brass.
- C. There shall be two (2) double acting hydraulic cylinders and two hydraulic lines for the circular tank flushing system. The double acting hydraulic cylinder shall be constructed entirely of 304 L stainless steel. The double acting hydraulic cylinders will be constructed to withstand the operating pressure of the system and will require no more than 120 bars to release or open the locking mechanism.
- D. The double acting hydraulic cylinders selected for use with the circular system shall be proven to be suitable for the intended use and such reliability shall have been demonstrated over a period of not less than 5 years of operating experience.
- E. Hydraulic fluid shall be supplied and as recommended by the flushing circular manufacturer. The minimum characteristics are as follows:
 1. Viscosity @ 40°C (104°F) shall be no less than 25.8 centistokes.
 2. Viscosity @ -40°C (-40°F) shall be no more than 896 centistokes.

- F. The hydraulic tubing, 1/2-inch diameter PVC coated stainless steel tubing, as well as its support system, will be made entirely of 304L stainless steel. All couplings will be SWAGELOCK quick connect type made entirely of 316L stainless steel, or approved equal.
- G. Buried hydraulic lines shall be flexible stainless steel lines run within a PVC containment pipe of large enough diameter to hold one line for each circular system with enough room to pull one additional line, if required. Diameter of containment pipe is based on sizes of end connections for each section of flexible steel line. Containment pipe size shall be as recommended by flushing circular manufacturer. Containment pipe shall use long radius bends and feature pull boxes after each bend. Stainless steel tubing is not acceptable for buried application. The flexible hydraulic lines shall be Parker-Hannifin Corp. 919B with conductive PTFE liner, 316 stainless steel braided wire sheath, or approved equal.
- H. Level indicators, required in order to control and activate the circular tank flushing system opening sequence, shall be Contegra model no. FS-90, 304 stainless steel or approved equal, equipped with applicable cable length and intrinsically safe circuit to render the level indicator explosion proof.
- I. Low-frequency, electromagnetic induction-type flow meter, producing a linear signal directly proportional to flow rate, consisting of flow tube, signal cable, and transmitter.

2.4 SYSTEM CONTROLS

- A. There will be one control panel/hydraulic power pack for the circular flushing system. The control panel will control the manual/auto operation of the system from a series of cabinet face mounted push buttons, located on the interior door of the enclosure. Each enclosure will be equipped with a PLC and a three-position key operated selector switch which will allow for MANUAL/OFF/AUTO operation. The control panel enclosure will house both the previously described hydraulic equipment and the electronic components. A second enclosure within the first will separate the electronic components from the hydraulic ones. The enclosure will be sized to accommodate the equipment required. It will be equipped with a main breaker and fuses.
- B. It will be equipped with status light indicators for the system, which will show if the system is "on" or "off", "manual" or "automatic" mode. It will also be equipped with alarms for each of the following; low oil level, high oil temperature, low oil pressure alarm. All alarms will be manually reset and alarms and status lights may have dry contacts for SCADA system connection.
- C. The control panel will be located as shown on the drawings. This panel will allow for manual operation (push button) of the circular system. Once a circular opening sequence is started, the control panel will not accept another signal, other than abort, until the circular flush operation is completed. It will be equipped with a status light indicating that it is open. The Control Panel will also be equipped with indicator lights to show if HWL conditions exists upstream of the circular system. The panel will meet

NEMA 4X requirements using Allen Bradley, Micrologix PLC and IEC parts. The enclosure will be constructed of stainless steel and be equipped with a key operated lock. All control functions and operator pushbuttons will be mounted on the internal door, which will be protected by the enclosure external door. The enclosure will be floor mounted.

- D. The PLC will be used to control the opening of the circular tank flushing system by using various internal timers and relays and by taking the upstream water level into consideration. It will use signals from the level indicator. The level indicator will be Contegra, model FS-90, 316 Stainless Steel Level Indicator equipped with applicable cable length and intrinsically safe circuit to render it explosion proof.
- E. The Control Panel will be equipped with a 24V- UPS power supply for emergency (power failure) use.

2.5 HYDRAULIC POWER PACK

- A. The hydraulic power pack consists of the electric motor, hydraulic fluid pump, the reservoir, the solenoid operated valves, the electronic and analogue (gauges) system alarms as well as an oil pressure buffer in order to operate the Hydrosel Circulators in case of a power failure. These items will be located in a dry and safe environment and as such must meet the specifications for such an environment. The enclosure will be rated NEMA 4X intrinsically safe barriers will be supplied to render the level float switches explosion proof.
- B. Each hydraulic power pack will house the following:
 - 1. One 5 HP electric motor, 480 VAC, three phase, 60 Hz motor.
 - 2. One ten (10) gallon hydraulic fluid reservoir.
 - 3. One (1) switch-over, quadruple ported, double acting, solenoid operated, hydraulic valve, 24 VAC, 60 Hz.
 - 4. One (1) normally open, double ported, single acting, solenoid operated, hydraulic valve, 120 VAC, 60 Hz.
 - 5. One (1) hydraulic fluid low level switch.
 - 6. One (1) hydraulic fluid high temperature switch.
 - 7. One (1) hydraulic fluid low pressure (when motor is operating) switch.
 - 8. One (1) adjustable pressure relief valve.
 - 9. One (1) gear pump with a capacity of 15 litres per minute at 1000 rpm.
 - 10. One temperature and level gauge.
 - 11. One pressure gauge from 0 to 120 bar.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. The circular tank flushing system shall be installed as shown on the approval drawings and documents, as designated herein and in the contract drawings.
- B. All required concrete inserts for the flushing circular anchoring system, shall be of 316 stainless steel and shall be supplied by the manufacturer and delivered to site well in advance of the pouring of the concrete.
- C. The circular tank flushing system shall be shipped to site in parts and ready to install. The hydraulic power packs/control panel will be preassembled and factory tested. All field connections to the level indicators, interconnections to control panel and power supply shall be the responsibility of the general contractor.
- D. The manufacturer's representative shall verify the concrete installation. This will require a one (1) eight hour day visit. The manufacturer's representative will verify the complete installation, make any necessary mechanical adjustments, and initiate start-up. A minimum period for this service shall be two (2), eight-hour days.
- E. The manufacturer's field engineer shall prepare a field report and submit the report to the ENGINEER.
- F. The equipment manufacturer shall provide the services of a qualified service engineer to instruct the OWNER'S personnel in the proper maintenance of the equipment. A minimum period for this service shall be four (4) hours.

3.2 TESTING

- A. Each component of the circular tank flushing system will be factory assembled and tested at the manufacturer's plant prior to shipment.
- B. The ENGINEER'S representative shall have access to witness the factory testing should it be requested.
- C. The maximum permissible leakage rate of the flush water storage area from the drawdown process until the tank is ready for flushing, shall not exceed 1/5 of the total flush volume.

3.3 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance (O&M) manuals shall be provided prior to or with the delivery of the equipment. The O & M manuals shall include instructions on storage, installation, start-up, and operation and maintenance, together with a complete parts list

and a recommended spare parts list. The O & M manuals shall be in compliance with the General Requirements.

END OF SECTION 464614

SECTION 6
STANDARD SPECIFICATIONS

STANDARD SPECIFICATIONS

1. The "Construction and Material Specifications" of the State of Ohio Department of Transportation (ODOT), 2023 edition, current ODOT supplemental specifications, and current ODOT standard drawings shall govern work and materials which are not specified or modified herein or on the project Contract Drawings. All references to "the Department" shall be changed to "the Owner or his Representative." The project Contract Drawings and Specifications, in the event of a discrepancy, shall supersede the ODOT Specifications.

The absence of an "As Per Plan" designation on some item descriptions in the proposal for which there are clear and controlling plan notes, specifications, or other requirements does not relieve the Contractor of the responsibility to read, bid and construct those particular items in accordance with the governing plan notes, specifications, or other requirements and the Contractor shall have no basis of claim based upon an "order of precedence".

ODOT 104.02 D., 611.04, 611.12, and 611.13 shall not apply to this project.

SECTION 7
SPECIFIC PROJECT REQUIREMENTS

SPECIFIC PROJECT REQUIREMENTS

1 - CONTACT DURING BIDDING

- 1.1 All questions during bidding should be addressed to Ryan Schuster, P.E., at Verdantas, LLC, 3875 Embassy Parkway, Suite 200, Akron, OH 44333, at (330) 247-3738.

2 - GEOTECHNICAL REPORTS

- 2.1 A Geotechnical Subsurface Investigation dated February 13, 2025 CT Consultants, Inc. and a Groundwater Monitoring Letter dated September 19, 2025 by SME were relied upon by the Engineer in the preparation of drawings and specifications. Copies of the report are provided along with each bid set but are not considered to be part of the contract documents.

3 - CORRECTION PERIOD

- 3.1 The Correction Period in Section 13.07 of the General Conditions shall be changed from a one (1) year to a two (2) year period.

4 - INSURANCE

- 4.1 See the following Bid Set Sections for Insurance Requirements:
- A. Section 1, Instructions to Bidders, Part 10 Insurance
 - B. Section 3, General Conditions, Article 5 Bonds and Insurance (EJCDC) or Article 11 Insurance and Bonds (AIA), whichever is used in the Bid Set
 - C. Section 4, Supplemental Conditions

5 - WORKING HOURS

- 5.1 No work shall be performed between the hours of **5:00 p.m.** and **7:00 a.m.** nor on Saturday, Sunday, or legal Holidays, without written permission of the Owner.

6 - PROJECT COMPLETION

- 6.1 All work including restoration and clean-up shall be completed no later than the contract completion date. Failure to complete all work within the allotted time will result in assessment of liquidated damages. Upon completion of all work and written notification of same by the Contractor, the Engineer and Owner will compile a punch list. The punch list will be sent to the Contractor. All punch list work shall be completed to the satisfaction of the Engineer and the Owner within 14 days after receipt of the punch list. Failure to complete the punch list work within the allotted time will result in assessment of liquidated damages.

7 – ASPHALT GRINDINGS

- 7.1 All grindings shall be disposed of by the contractor except for up to 5 truckloads to be delivered to one location within the Owner's municipal limits.

8 - DRUG-FREE WORKPLACE PROGRAM

- 8.1 In accordance with Ohio Revised Code §153.03 and during the life of this project, the Contractor and all its Subcontractors that provide labor on the Project site must be enrolled in and remain in good standing in the Ohio Bureau of Worker's Compensation ("OBWC") Drug-Free Workplace Program ("DFWP") or a comparable program approved by the OBWC.

9 - OHIO ETHICS LAW

- 9.1 Contractor agrees that it is currently in compliance and will continue to adhere to the requirements of Ohio Ethics law as provided by Section 102.03 and 102.04 of the Ohio Revised Code.

10 - PERIODIC PAYMENTS

- 10.1 This project is expected to be funded in whole or in part by the Ohio EPA **WPCLF/WSRLA** Program. The Contractor shall comply with all requirements of this program. The periodic payments to the Contractor may be made in whole or in part through the OWNER and/or OWDA. In paragraph 14.02 C.1. of the General Conditions, change "ten days" to "sixty days."
- 10.2 Ohio EPA must approve all change orders prior to a change order item being paid on a pay estimate.

11 - NOTICE TO RESIDENTS

- 11.1 The Contractor shall pay for and include in his bid for other items, all necessary costs for notifying each Resident by a **Form Letter** prior to each lateral replacement.
- 11.2 A copy of the **Form Letter** shall be forwarded to the City's Director of Public Service for his approval prior to the letters being distributed to Residents.
- 11.3 No work shall be performed by the Contractor until **Form Letters** have been distributed to each Resident three (3) days prior to the anticipated start of construction at each location.
- 11.4 Failure to properly notify affected Residents will be sufficient cause to prohibit the Contractor from working until proper corrective action is taken at no penalty to the City.

END OF SECTION

SECTION 8
SPECIAL REQUIREMENTS - EPA

Contract Document Provisions

- The following contract requirements and forms are to be included in the construction contract documents. Completed copies of the forms are to be submitted to Ohio EPA within one week after bids are received, or sooner, dependent on your individual project schedule. Bid packages for WPCLF projects should be submitted to DEFA in the central office while bid packages for WSRLA projects should be submitted to the appropriate DDAGW district office.

Equal Employment Opportunity (EEO) Requirements

The Contractor's EEO Certification Form must be (1) included in the contract documents and (2) referenced in the Instructions to Bidders, informing bidders that the form must be completed and submitted with their bid.

NOTE: If the loan applicant has its own EEO requirements, local procedures and forms may be substituted for the EPA form.

Debarment

The Certification Regarding Debarment, Suspension, and Other Responsibility Matters must be (1) included in the contract documents and (2) referenced in the Instructions to Bidders, informing bidders that the form must be completed and submitted with their bid.

Disadvantaged Business Enterprises (DBE) Utilization

The DBE Specification language and instructions to the bidders and Forms 6100-3, 6100-4 and 6100-2 must be (1) included in the contract documents and (2) referenced in the Instructions to Bidders, informing bidders that the forms must be completed and submitted with their bid.

NOTE: If the loan applicant has its own DBE requirements or if other funding programs with potentially competing DBE requirements are participating in the project funding, please contact Ohio EPA – DEFA for specific instructions regarding the DBE requirements.

Davis-Bacon wage rate requirements

The contract documents must include language that requires contractors and subcontractors to pay wages at rates not less than those prevailing on similar projects within the area as determined by the US Secretary of Labor. In addition, the loan recipient will be required to conduct wage interviews and monitor payroll for compliance.

Build America, Buy America (Lead Service Line, Emerging Contaminant, Equivalency Projects)

Build America Buy America Act (BABA) requirements apply to Lead Service Line, Emerging Contaminants and equivalency projects funded by a WPCLF assistance agreement and/or a WSRLA assistance agreement. Equivalency projects are those receiving funding from federal capitalization grants that support the WPCLF and WSRLA programs. The acknowledgement form must be included in the contract documents. The acknowledgement form should be signed by the contractor and submitted with the final bid package. It is recommended that the BABA guidance document and questions and answers document be included in the contract documents.

American Iron and Steel

All treatment works projects funded by a WPCLF assistance agreement and all public water system projects funded by a WSRLA assistance agreement are required to comply with American Iron and Steel (AIS) requirements. The acknowledgement form must be included in the contract documents. The acknowledgement form should be signed by the contractor and submitted with the final bid package. It is recommended that the AIS guidance document and questions and answers document be included in the contract documents.

- The following contract requirements are to be included in the construction contract documents but are not required to be submitted to Ohio EPA for contract endorsement.

Violating Facilities Clause

Language prohibiting this use of equipment or services from anyone on the EPA List of Violating Facilities must be included in the contract documents.

Small Businesses in Rural Areas (SBRA)

Language encouraging the participation of small businesses in rural areas should be included in the contract documents.

Prohibition on Telecommunications and Video Surveillance

Restrictions to loan recipients and subrecipients on certain telecommunications and video surveillance services or equipment due to Public Law 115-232.

Insurance Provisions

Section 3.5 of the WPCLF/WSRLA Loan Agreement contains specific requirements regarding insurance for all contractors and all subcontractors for the life of the contract. These insurance requirements must be reflected in the contract documents. Adjust the language as needed to meet the specifics of the construction project while still meeting the provisions of the Loan Agreement.

Materials Testing

In addition to the details included with specific equipment testing in the specifications, there should be an overall statement regarding testing for the project. Adjust the language as needed to meet the specifics of the construction project.

Continuous Treatment Provisions

It is important that construction activities not result in any temporary violations of Drinking Water or NPDES permit requirements (for permitted facilities). Construction activities should interrupt wastewater service to the individual resident as little as possible. For drinking water projects, it is important that construction activities not result in any disruption of service. The example language is intended for construction work occurring at an existing drinking water plant or a WWTP and must be adjusted to meet the specifics of the construction project.

[WPCLF/WSRLA Change Order Form](#)

All change orders for the construction project must be executed on the WPCLF/WSRLA change order form. The form must be (1) included in the contract documents and (2) the instructions referenced in the Contract Documents.

- The following contract requirements are provided in Ohio Revised Code (ORC). Some loan applicants have local requirements that supersede ORC provisions for competitive bidding, and these local requirements can be applied instead of ORC, except for those requirements specified in the WPCLF/WSRLA loan agreements.

Bid Guarantee

The requirements for a bid guarantee (which can be a bond or a certified check, cashier's check, or letter of credit) are covered in ORC 153.54.

Payment and Performance Bonds

The requirements for a Payment and Performance Bond are covered in ORC 153.54 and Section 3.4 of the WPCLF/WSRLA Loan Agreements.

Payment Retention

The requirement for payment retainage is provided in ORC 153.12. Details on how the escrow account that holds the retainage are provided in ORC 153.13. Further details on how and when to pay for materials delivered and installed are provided in ORC 153.14.

Completion Time

The contract documents must state the length of the contract time per ORC 153.19. The dates for Initiation of Operation and Project Completion are specified in the WPCLF/WSRLA Loan Agreements and need to coincide with the specified contract time.

- The following are contract provisions to consider but are not required. The language provided for each are samples only and must be adjusted to reflect the specifics of the project and local needs.

[Local Protest Procedure](#)

Some statement as to when a valid protest must be filed, in what form it must be filed and who it must be filed with should be included. ORC 153.12 has some default procedures for handling disputes. If the owner wants more control than provided in ORC, a procedure needs to be spelled out in the Contract Documents.

[Basis and Method for Award](#)

The contract documents should include some language that clearly states what the Owner will consider when determining the successful bidder and to provide a clear basis for the Owner when they have a need to reject the low bidder and go with a different bidder.

[Payment Methods](#)

To minimize uncertainty and arguments that can slow down the progress of construction it is useful to provide language stating how and when the Contractor will get paid. In addition to ORC and other local requirements, the involvement of public funding Agencies such as the WPCLF, WSRLA, Ohio Public Works Commission and Community Development Block Grant impact the process and timing for payments.

Contract Documents Review (pre-advertising)

Whenever possible, all the provisions listed above must be included in the contract documents for the project prior to advertisement for bids. Ohio EPA's review for these contract provisions will occur as part of our normal detail plans and specifications review. The bidding documents are to be submitted to Ohio EPA for review regardless of whether a Permit to Install or a Plan Approval is required for the project.

After bidding has started:

In those cases when WPCLF or WSRLA funding is being requested after advertisement for bids has started, add all missing contract provisions, forms, and requirements via addendum.

After bids have been opened but before contracts have been signed:

If the bid advertisement period is over and bids have been opened, but the construction contract have not been signed yet, provide a draft contract change order which would be used to incorporate all missing contract provisions, forms, and requirements into the contract. This should be done in consultation with local legal counsel to address any potential bid protest concerns.

Construction contracts have already been signed:

If the construction contract has already been signed, a contract change order must be executed incorporating all missing contract provisions, forms, and requirements into the contract.

A [Contract Documents Review checklist](#) is provided here to help ensure that all requirements are included and to help expedite Ohio EPA's review of your documents.

Bid Package Submittals (post-advertising)

Certain documents must be submitted to Ohio EPA within one week after bids are received, or sooner dependent on your individual project schedule. Please [look here for a complete list](#) of the required submittals.

NOTE: THE CONTRACT LANGUAGE SAMPLES PROVIDED HEREIN ARE EXAMPLES OF WHAT COULD BE INCLUDED IN ALL CONTRACTS THAT USE WPCLF OR WSRLA FUNDS. OHIO EPA MAKES NO CLAIMS REGARDING THE LEGALITY OF THESE CLAUSES WITH RESPECT TO STATE OR LOCAL LAW. IT IS IMPERATIVE THAT ANY PARTY INSERTING THESE CLAUSES INTO A CONTRACT VERIFY THAT THEY ARE LEGAL AND ENFORCEABLE ACCORDING TO STATE AND LOCAL LAWS, REGULATIONS, AND ORDINANCES.

Disadvantaged Business Enterprises (DBE) Utilization

(Required Contract Provision)

USEPA has a program to encourage the participation of disadvantaged businesses in the construction activities funded by the Clean Water and Drinking Water SRF's. "DBE" is an all-inclusive term that includes Minority Business Enterprises (MBE), Women Business Enterprises (WBE), Small Business Enterprises (SBE), Small Business in Rural Areas (SBRA), HUBZone Small Business, Labor Surplus Area Firms (LSAF), and other entities defined as socially and/or economically disadvantaged. While the WPCLF and WSRLA strongly encourage participation by all disadvantaged groups, specific participation goals are negotiated with USEPA only for Minority Business Enterprises and Women's Business Enterprises.

Goals

As a condition of receiving capitalization grants from U.S. EPA for the Water Pollution Control Loan Fund (WPCLF) and the Water Supply Revolving Loan Account (WSRLA), the Ohio EPA negotiates "fair share" Disadvantaged Business Enterprises (DBE) objectives with U.S. EPA. **The current negotiated goal for construction related activities is 5.4% (the total goal is based on 3.1% of MBEs and 2.3% of WBEs participation).**

DBE Certification

Under the DBE program, qualified DBE's are those that have been certified as an MBE or WBE. Certifications can be obtained from a federal agency such as the Small Business Administration or the Department of Transportation or by an approved State agency. The Unified Certification Program (UCP) administered by the Ohio Department of Transportation (ODOT) can provide the necessary DBE certifications. Information on the UCP can be found at www.ohioucp.org as well as the ODOT website <https://www.transportation.ohio.gov/programs/business-economic-opportunity/dbe>. The Department of Development operates the Encouraging Diversity Growth and Equity Program (EDGE), the other state approved DBE certification program. Information on EDGE can be found at <https://development.ohio.gov/business/minority-business/business-certifications/encouraging-diversity-growth-and-equity-program>.

DBE Qualifications

To qualify for MBE certification, businesses must be 51 percent owned and controlled by a U.S. citizen and Ohio resident belonging to an African American, Native American, Hispanic, or Asian American ethnic group. In addition, the business must be in operation for at least one year prior to submitting an application. For DBE status, a business must be at least 51 percent owned by a socially and economically disadvantaged person who participates in the daily operations of the business. This person must be a woman or of African-American, Hispanic, Native American, Asian American ethnicity.

Program Requirements

To comply with DBE program requirements the WPCLF/WSRLA loan recipient must do the following:

1. Create and maintain a bidder's list (see description below)

2. Include contract conditions applicable to the DBE program in all procurement contracts entered into by the Borrower for all WPCLF and WSRLA projects. These conditions are listed below.
3. Follow, document, and maintain documentation of good faith efforts on the part of prime contractors to ensure that Disadvantaged Business Enterprises (DBEs) have the opportunity to participate in the project.
4. Review the Form 6100-3 and 6100-4 submittals provided by bidders on the project for completeness and obtain any additional information necessary to verify the certification status of all proposed subcontractors.
5. Obtain documentation of the good faith efforts of the prime contractor if the prime contractor does not meet the MBE or WBE goal.
6. Obtain a written confirmation from any prime contractor states that they will not meet the MBE and WBE goals because they will not be entering into any agreements for goods or services with any company, firm, joint venture, or individual.
7. Submit the following to the Ohio EPA/DEFA as part of the bid package upon which the WPCLF/WSRLA loan amount is determined:
 - Form 6100-3 from each subcontractor
 - Form 6100-4 from each prime contractor
 - a copy of the Good Faith Efforts documentation from any prime contractors that will not meet the MBE and WBE goals,
 - if any of the prime contractors will not meet the MBE and WBE goals because they will not be entering into any agreements for goods or services with any company, firm, joint venture, or individual, a copy of the written confirmation from that prime contractor
8. Report MBE/WBE accomplishments on Form 5700-52A annually (within 15 days after October 1st).

NOTE: It is up to the WPCLF/WSRLA loan recipient whether or not to require completion and submission of Forms 6100-3 and 6100-4 from all bidders with the bid proposal or to accept completion and submission from the successful bidder(s) only at some time after bids are received. Regardless of whether the forms are completed and submitted with the bids or at some later time once the successful bidders are identified, completed forms are to be submitted to Ohio EPA with the bid package.

To comply with DBE program requirements all prime contractors must do the following:

1. Follow, document, and maintain documentation of their good faith efforts.
2. Complete and submit **Form 6100-4 DBE Subcontractor Utilization Summary** as part of the bid proposal package to the loan recipient.
3. Have its Disadvantaged Business Enterprise subcontractors complete **Form 6100-3 DBE Subcontractor Proposed Performance Form** and submit those as part of the bid proposal package to the loan recipient.
4. Provide **Form 6100-2 DBE Subcontractor Actual Participation Form** to all of its Disadvantaged Business Enterprise subcontractors for completion at the end of the work.
5. During construction, provide the data necessary so that the loan recipient can report MBE/WBE accomplishments on Form 5700-52A annually (within 15 days after October 1st).

Bidders List

The Borrower must create, maintain, and use a bidders list for purposes of soliciting both MBE/WBEs and non-MBE/WBEs during procurement of construction, equipment, supplies, and services. This list shall include:

1. Entity's name with point of contact;
2. Entity's mailing address, telephone number, and e-mail address;
3. The procurement on which the entity bid or quoted, and when; and
4. Entity's status as an MBE/WBE or non-MBE/WBE.

Borrowers that receive less than \$250,000 or less in any one fiscal year can be exempt from maintaining a Bidders List.

The Bidders List shall be maintained until the project period has expired and the Borrower is no longer receiving EPA funding. The Bidders List must include all firms that bid on the prime contracts, or bid or gave a quote on subcontracts, including both MBE/WBEs and non-MBE/WBEs.

Required Contract Conditions

The DBE Specification language and instructions to the bidders and Forms 6100-2, 6100-3 and 6100-4 must be included in the contract documents and referenced in the Instructions to Bidders, informing bidders that the forms must be completed and submitted with their bid for all WPCLF and WSRLA projects:

1. The prime contractor must pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment from the owner.
2. The prime contractor must notify the owner in writing prior to the termination of any Disadvantage Business Enterprise subcontractor for convenience by the prime contractor.
3. If a Disadvantage Business Enterprise contractor fails to complete work under the subcontract for any reason, the prime contractor must employ the six Good Faith Efforts (listed below) if soliciting a replacement contractor.
4. The prime contractor must employ the six Good Faith Efforts even if the prime contractor has achieved its fair share objectives.
5. An owner must ensure that each procurement contract it awards contains the following terms and conditions:

The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR Part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

Good Faith Efforts

Borrowers and their prime contractors must follow, document, and maintain documentation of their good faith efforts as listed below to ensure that Disadvantaged Business Enterprises (DBEs) have the opportunity to participate in the project by increasing DBE awareness of procurement efforts and outreach.

1. Ensure DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities; including DBEs on solicitation lists and soliciting them whenever they are potential sources.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could be subcontracted with DBEs. This will include dividing total requirements when economically feasible into smaller tasks or quantities to permit participation by DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the services and assistance of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take the steps in numbers 1 through 5 above.

DBE Forms

Form 6100-3 – Each prime contractor must have its DBE subcontractors complete **Form 6100-3 DBE Subcontractor Proposed Performance Form**. This form gives the DBE subcontractor the opportunity to report the scope and cost of the subcontract and it should be forwarded to the Prime Contractor along with the DBE's quote. Each subcontractor completes one Form 6100-3. The Borrower must submit all Form 6100-3 forms to the Ohio EPA/DEFA as part of the bid package upon which the WPCLF/WSRLA loan amount is determined.

Form 6100-4 – Each prime contractor must complete and submit **Form 6100-4 DBE Subcontractor Utilization Summary** as part of the prime contractor's bid proposal package to the Borrower. This form summarizes the Prime Contractor's intended use of identified DBE(s) and the estimated dollar amount of each subcontract. Only one Form 6100-4 form is required from each Prime Contractor. The Borrower must submit this form to the Ohio EPA/DEFA as part of the bid package upon which the WPCLF/WSRLA loan amount is determined.

Form 6100-2 - The prime contractor must provide **Form 6100-2 DBE Subcontractor Actual Participation Form** to all of its Disadvantaged Business Enterprise subcontractors.

This form gives the DBE subcontractor the opportunity to describe the work the DBE received from the Prime Contractor, how much the DBE was paid and any other concerns the DBE might have. Disadvantaged Business Enterprise subcontractors must send completed Form 6100-2 directly to the Region 5 DBE Coordinator after the work by the subcontractor is done and is NOT submitted with the bid package to Ohio EPA.

Region 5 MBE/WBE Coordinator
USEPA, Acquisition and Assistance Branch
77 West Jackson Boulevard (MC-10J)
Chicago, IL 60604

Reporting During Construction – Form 5700-52A

The purpose of MBE/WBE reporting is to monitor the grant recipient's accomplishments in utilizing MBEs and WBEs; and adherence to the good faith efforts (i.e., outreach to MBEs, WBEs, and other DBEs); and progress in achieving MBE and WBE Goals. During the progress of the construction project, the loan recipient must complete & submit Form 5700-52A annually (**within 15 days after October 1st**). If there were no MBEs or WBEs utilized, or no procurement expenditures of any kind were made during the reporting period, a "negative report" is still required.

Reports are to be sent to:

Florel Fraser, Ohio EPA – DEFA
P.O. Box 1049
Columbus, OH 43216-1049
E-mail address: Florel.Fraser@epa.ohio.gov
Phone: (614) 644-3636

**Disadvantaged Business Enterprise (DBE) Program
DBE Subcontractor Participation Form**

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g., in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services , Equipment or Supplies	Amount Received by Prime Contractor

¹ A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

² Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

Disadvantaged Business Enterprise (DBE) Program DBE Subcontractor Participation Form

Please use the space below to report any concerns regarding the above EPA-funded project:

[illegible]

Subcontractor Signature	Print Name
Title	Date

ALERT

“Total Procurement” fields and “MBE/WBE Combined Procurement” fields located in section 4B of this form should include Federal funds provided under the assistance agreement, recipient matching funds, and funds from other sources that are included in the assistance agreement.

Due to process time of Paperwork Reduction Act procedures, EPA is not able to update the [EPA Form 5700-52A](#) immediately to reflect this clarification.

If EPA grant recipients have questions about [EPA Form 5700-52A](#), please work with your respective Grants Specialist or [DBE Coordinator](#).



U.S. ENVIRONMENTAL PROTECTION AGENCY MBE/WBE UTILIZATION UNDER FEDERAL GRANTS AND COOPERATIVE AGREEMENTS

This collection of information is approved by OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. (OMB Control No. 2030-0020). Responses to this collection of information are required to obtain an assistance agreement (40 CFR Part 30, 40 CFR Part 31, and 40 CFR Part 33 for awards made prior to December 26, 2014, and 2 CFR 200, 2 CFR 1500, and 40 CFR Part 33 for awards made after December 26, 2014). An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The public reporting and recordkeeping burden for this collection of information is estimated to be 1 hour per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates and any suggested methods for minimizing respondent burden to the Regulatory Support Division Director, U.S. Environmental Protection Agency (2821T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

1A. REPORTING PERIOD October 1, — September 30,				1B. REPORT TYPE ☐ Annual ☐ Final Report (Project completed)	
1C: Revision of a Prior Year Report? ☐ No ☐ Yes If yes, what reporting period is being revised and briefly describe the changes made. Note: The revised report will replace the associated original report in its entirety.					
2A. RECIPIENT UNIQUE ENTITY IDENTIFIER					
2B. RECIPIENT REPORTING CONTACT Name: Email: Phone:					
3. FEDERAL AWARD IDENTIFICATION NUMBER (FAIN) (For SRF state recipients, please include all numbers for all open assistance agreements being reported on this form.)					
4A. If NO procurements were made this reporting period (by the recipient, sub-recipient(s), loan recipient(s), and prime contractor(s)), CHECK and SKIP to Block No. 6. (Procurements are all expenditures through contract, order, purchase, lease or barter of supplies, equipment, construction, or services needed to complete Federal assistance programs.) ☐					
4B. Total Procurements & MBE/WBE Accomplishments This Reporting Period (in dollars)					
	Construction	Non-Construction	Total		
Total Procurement:	\$ _____	\$ _____	\$ _____		
MBE/WBE Combined Procurement:	\$ _____	\$ _____	\$ _____		
5A. Good Faith Efforts: If procurements were made, indicate whether your organization has followed the six Good Faith efforts found in 40 CFR Part 33, Subpart C, 40 CFR 33.501 and 2 CFR 200.321. ☐ Yes, my organization has implemented and documented each of the six Good Faith Efforts on the procurements made during this reporting period. ☐ No, my organization has not implemented and documented each of the six Good Faith Efforts on the procurements made during this reporting period.			5B. If procurements were made, but no MBE/WBE procurements are being reported, then check the applicable box(es) for the reason(s) why no MBE/WBE procurements were made. ☐ No MBE/WBE(s) applied ☐ No MBE/WBE(s) were qualified ☐ Other:		
6. NAME OF RECIPIENT'S AUTHORIZED REPRESENTATIVE			TITLE		
7. SIGNATURE OF RECIPIENT'S AUTHORIZED REPRESENTATIVE			DATE		

Instructions:

A. General Instructions:

MBE/WBE utilization is based on 40 CFR Part 33 and 2 CFR Parts 200 and 1500. The reporting requirement reflects the change in the reporting threshold described in Recipient/ Applicant Information Notice-2018-G04 issued by EPA's Office of Grants and Debarment on September 7, 2018 (<https://www.epa.gov/grants/rain-2018-g04>). EPA Form 5700-52A must be completed annually by recipients of financial assistance agreements where the combined total of funds budgeted for procuring supplies, equipment, construction and services exceeds the current Simplified Acquisition Threshold as set by the Federal Acquisition Regulation at 48 CFR Subpart 2.1. This reporting requirement applies to all new and existing awards and voids all previous reporting requirements.

In determining whether the threshold is exceeded for a particular assistance agreement, the analysis must focus on funds budgeted for procurement under the supplies, equipment, construction, services or "other" categories, and include funds budgeted for procurement under sub- awards or loans.

Reporting will also be required in cases where the details of the budgets of sub-awards/loans are not clear at the time of the grant awards and the combined total of the procurement and sub-awards and/or loans exceeds the Simplified Acquisition Threshold.

For example, if the Simplified Acquisition Threshold is \$250,000, then if a recipient has \$300,000 budgeted under procurement, then completion of this report is required.

When reporting is required, all procurement actions are reportable, not just the portion which exceeds the Simplified Acquisition Threshold.

If at the time of award the budgeted funds exceed the Simplified Acquisition Threshold but actual expenditures fall below, a report is still required.

If at the time of award, the combined total of funds budgeted for procurements in any category is less than or equal to the Simplified Acquisition Threshold and is

maintained below the threshold, no DBE report is required to be submitted.

Recipients are required to report 30 days after the end of each federal fiscal year (i.e. October 30th), per the terms and conditions of the financial assistance agreement.

Final reports are due October 30th or 120 days after the end of the project period, whichever comes first.

MBE/WBE program requirements, including reporting, are material terms and conditions of the financial assistance agreement. Failure to comply may lead to termination of the financial assistance agreement which is then reported to the OMB-designated integrity and performance system accessible through SAM (currently FAPIIS) pursuant to 2 CFR 200.339(b).

B. Submission:

Recipients must submit completed forms to the point of contact associated with the awarding office for the applicable assistance agreement.

Information on specific points of contact for EPA's Headquarters and ten Regional Offices is located at:

<https://www.epa.gov/grants/frequently-asked-questions-disadvantaged-business-enterprises>

Questions regarding the completion of this form should be directed to the DBE Coordinator associated with the awarding office for the applicable assistance agreement. A list of the DBE Coordinators for each awarding office can be located here:

<https://www.epa.gov/grants/epa-dbe-program-coordinators>

c. Instructions:

1A. Specify Federal fiscal year this report covers. The Federal fiscal year runs from October 1st through September 30th (**e.g. November 29, 2020 falls within Federal fiscal year 2021**)

1B. Specify report type. Check the annual reporting box if this is an annual report. If it is a final report, check the final report box to indicate if the project is completed.

1C. Indicate if this is a revision to a previous year and provide a brief description of the revision you are making including what reporting period is being revised. The revised report will replace the associated original report in its entirety.

2A. Provide your organization's Unique Entity Identifier. More information about Unique Entity Identifier, including its meaning, can be found in 2 CFR Part 25.

2B. Identify the name and contact information for the person located within the recipient organization that can be contacted if questions arise from this report.

3. Provide the Federal Award Identification Number (FAIN) assigned by EPA. A separate report must be submitted for each Assistance Agreement.

***For SRF recipients:** In box 3 list numbers for ALL OPEN Assistance Agreements being reported on this form.

4A. Self-explanatory. **Note:** Procurement means expenditures under the supplies, equipment, construction, services or "other" categories, and include funds expended for procurement under sub-awards or loans.

4B. Provide the total dollar amount (in dollars) of **ALL** procurements awarded this reporting period by construction, non-construction, and grand total by the recipient, sub-recipients, and SRF loan recipients, **including** MBE/WBE expenditures, not just the portion which exceeds the threshold. For example: Actual dollars for procurement from the procuring office; actual contracts let from the contracts office; actual goods, services, supplies, etc., from other sources including the central purchasing/ procurement centers).

Provide the total dollar amount (in dollars) of MBE/WBE procurements **ONLY** awarded this reporting period by construction, non-construction, and grand total by the recipient, sub-recipients, SRF loan recipients, and prime contractors not just the portion which exceeds the threshold.

***For SRF recipients only:** In 4B, please enter the total annual procurement amount under all of your SRF Assistance Agreements. The figure reported in this section is **not** directly tied to an individual Assistance Agreement identification number. **(SRF state recipients report state procurements in this section)**

5A. Self-explanatory.

5B. If procurements were made during this reporting period, but no procurements with MBE(s) or WBE(s) are being reported, then select the reason why. If "Other" is chosen, please fill in with the reason.

6. Self-explanatory.

7. Self-explanatory.

****This data is requested to comply with provisions mandated by: statute or regulations (40 CFR Part 33 and/or 2 CFR Parts 200 and 1500); OMB Circulars; or added by EPA to ensure sound and effective assistance management. Accurate, complete data are required to obtain funding, while no pledge of confidentiality is provided.**

Material Suppliers

In October 2009, OEPA/DEFA made a clarification to their DBE Policy. If a Contractor subcontracts work and cannot meet the Goals with MBE/WBE Subcontractors, the Goals may be met by supplying equipment from MBE/WBE Suppliers.

Also, Contractors that do not subcontract work do not have to comply with the MBE/WBE requirements although all Contractors are strongly encouraged to break the work into subcontracts whenever feasible.

Violating Facilities Clause

Violating Facilities:

The Contractor agrees to comply with all applicable standards, orders or requirements under Section 306 of the Clean Air Act, 42 USC 1857 (h), Section 508 of the Clean Water Act, 33 USC 1368, Executive Order 11738, and EPA regulations, 40 CFR Part 32, which prohibits the use under non-exempt Federal contracts, grants, or loans of facilities included on the EPA List of Violating Facilities.

Requirement For Utilization Of Small Businesses In Rural Areas (SBRA)

This procurement is subject to the EPA policy of encouraging the participation of small businesses in rural areas. It is EPA policy that recipients of EPA financial assistance awards utilize the services of small businesses in rural areas (SBRAs), to the maximum extent practicable. The objective is to assure that such small business entities are afforded the maximum practicable opportunity to participate as subcontractors, suppliers and otherwise in EPA-awarded financial assistance programs. This policy applies to all contracts and subcontracts for supplies, construction, and services under EPA grants or cooperative agreements. Small purchases are also subject to this policy.

This procurement is subject to the EPA policy of encouraging the participation of small business in rural areas (SBRAs).

Local Protest Procedure

Protests

A protest based upon an alleged violation of the procurement requirement may be filed against the OWNER's procurement action by a party with an adversely affected direct financial interest. The protest shall be filed with the Mayor. The OWNER shall determine the protest. The OWNER may request additional information or a hearing in order to resolve the protest.

A protest shall be filed as early as possible during the procurement process, but must be received by the OWNER no later than one week after the basis of the protest is known or should have been known, whichever is earlier. If the protest is mailed, the protester bears the risk of nondelivery within the required time period.

A protest must clearly present the procurement requirement being protested, the facts which support the protest, and any other information necessary to support the protest.

Continuous Treatment Provisions

It is important that construction activities not result in any temporary violations of NPDES permit requirements (for permitted facilities) and construction activities should interrupt wastewater service to the individual resident as little as possible. For drinking water projects, it is important that construction activities not result in any disruption of service. Any disruption of service must be immediately reported to the Ohio EPA, Drinking Water Section of the appropriate district office.

Continuous Treatment (wastewater projects)

Federal regulations prohibit by-passing of any sewage during construction operations. The Contractor will be responsible for providing any required temporary pumping facilities piping, etc., necessary to complete the project without any plant by-passing and continuous treatment must be provided at the same level during construction as existed prior to construction.

Unless otherwise previously or subsequently specified, the Contractor shall procure and pay for all permits, licenses, and approvals necessary for the execution of his Contract.

The Contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work required to complete their Contract.

The following example language is a sample of what might be appropriate for construction work occurring at an existing drinking water treatment plant. The language actually incorporated into the contract documents must be adjusted to meet the specifics of the construction project.

Continuous Treatment (drinking water projects)

The Contractor will be responsible for obtaining approval from Ohio EPA for use of temporary pumping facilities, piping and other items in order to complete the project without any plant by-passing. Continuous treatment must be provided at the same level during construction as existed prior to construction.

Unless otherwise previously or subsequently specified, the Contractor shall procure and pay for all permits, licenses, and approvals necessary for the execution of his Contract.

The Contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work required to complete their Contract.

WPCLF/WSRLA Payments

This project is funded in whole or in part by funds from the Water Pollution Control Loan Fund (WPCLF) or the Water Supply Revolving Loan Account (WSRLA) as administered by the Ohio EPA-DEFA and the Ohio Water Development Authority (OWDA). The Contractor shall comply with all requirements of these programs. The Owner shall be responsible for the progress payments to the Contractor if the Owner becomes ineligible for further payments due to circumstances which are of no fault of the Contractor. The monthly payments to vendors may be made through the Owner, the OWDA, or both as deemed by the Owner.

The time frame for payment of pay estimates by the Owner and/or Special Funding Agency(s) may be up to 60 calendar days from date of receipt of pay estimate from Engineer to Owner. Ohio EPA/DEFA must approve all change orders before the change order may be submitted for payment on a pay estimate.

CONTRACT CHANGE ORDER

CHANGE ORDER INSTRUCTIONS:

All Change Orders for this work, regardless of costs and whether Water Pollution Control Loan Fund (WPCLF) or Water Supply Revolving Loan Account (WSRLA) funding will be used to finance the changes, must be submitted to Ohio EPA for review.

Changes Requiring Prior Approval

Any change which substantially modifies the Project Facilities as specified in the Ohio EPA approved Facilities Plan and Final Permit to Install or Final Plan Approval (when applicable) or alters the direct or indirect impact of the Project Facilities upon the environment must be incorporated into a Change Order. One copy of the Change Order prior to execution is to be submitted to Ohio EPA for review and prior approval of the acceptability of the change. "Prior to execution" means before the Change Order is signed by the Owner.

Ohio EPA will review the Change Order and inform the Owner of the technical, environmental and operational acceptability of the change, and give the Owner permission to proceed with the proposed work.

All Other Changes

Change Orders not requiring prior approval as described above must be submitted to Ohio EPA within one (1) month of the time at which they are approved by the Owner. All change orders must be submitted electronically to dedicated change order email addresses for WPCLF and WSRLA projects.

Change Order Approval Process

After the Change Order is executed, one (1) copy of the Change Order, including the supporting documentation, is to be sent electronically to Ohio EPA for final review.

The dedicated e-mail address for the electronic submittal of WPCLF Change Orders is EPAWPCLFCO@epa.ohio.gov.

The dedicated e-mail address for the electronic submittal of WSRLA Change Orders is EPAWSRLACO@epa.ohio.gov.

After the Change Order is accepted and eligible costs determined, Ohio EPA will issue a letter informing the Owner and authorizing OWDA to disburse funds from Project Contingency for the work. The OEPA letter will be sent electronically along with a PDF of the WPCLF/WSRLA Change Order form which will be signed by all parties including Ohio EPA and OWDA.

Payments for Change Order Work

The Owner is precluded from submitting to the OWDA payment requests for Eligible Project Costs associated with the Change Orders until such time as the Ohio EPA's approval of the Change Orders has been obtained.



November 3, 2022

MEMORANDUM

SUBJECT: Build America, Buy America Act Implementation Procedures for EPA Office of Water Federal Financial Assistance Programs

FROM: Radhika Fox
Assistant Administrator

A handwritten signature in dark ink, appearing to be "R. Fox", is placed to the right of the "FROM:" line.

TO: EPA Regional Water Division Directors, Regions I – X
EPA Office of Water Office Directors

OVERVIEW

The Biden-Harris Administration recognized the Nation's critical need for infrastructure investment, championing the Bipartisan Infrastructure Law (BIL), which Congress passed on November 15, 2021 (also known as the Infrastructure Investment and Jobs Act (IIJA)). The BIL will provide an unprecedented level of federal investment in water and wastewater infrastructure in communities across America.

In Title IX of the IIJA, Congress passed the Build America, Buy America (BABA) Act, which establishes strong and permanent domestic sourcing requirements across all Federal financial assistance programs for infrastructure. The U.S. Environmental Protection Agency (EPA) Office of Water is honored to help lead the implementation of these provisions and is proud of its near decade of successful implementation of the American Iron and Steel (AIS) provisions for its flagship water infrastructure programs.

This is a transformational opportunity to build a resilient supply chain and manufacturing base for critical products here in the United States that will spur investment in good-paying American manufacturing jobs and businesses. EPA's efforts to implement BABA will help cultivate the domestic manufacturing base for a wide range of products commonly used across the water sector but not currently made domestically. This will take time, and flexibility will be important to ensure that EPA can leverage critical water investments on time and on budget to protect public health and improve water quality.

IMPLEMENTATION

Recognizing the opportunity and need for BABA implementation guidance, the Made in America Office (MIAO) of the Office of Management and Budget (OMB) published [Initial Implementation Guidance on Application of Buy America Preference in Federal Financial Assistance Programs for Infrastructure](#) (OMB Guidance M-22-11) on April 18, 2022. The guidance provides government-wide implementation direction for all Federal financial assistance programs for infrastructure. Despite the extensive guidance developed by MIAO, EPA's Office of Water infrastructure investment programs have received many questions that were not addressed in OMB Guidance M-22-11 or that require further clarification for EPA water infrastructure programs. The following questions and answers serve to supplement OMB Guidance M-22-11 with implementation procedures specific to EPA's relevant water infrastructure programs.

Section 70914(a) of the IIJA states when a Buy America preference under BABA applies: "Not later than... [May 14, 2022], the head of each Federal agency shall ensure that none of the funds made available for a Federal financial assistance program for infrastructure...may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States." Therefore, Federal financial infrastructure investments obligated on or after May 14, 2022, must comply with the BABA requirements. Absent a waiver, all iron, steel, manufactured products, and construction materials permanently incorporated into an infrastructure project subject to the BABA requirements must be produced in the United States. For many of EPA's Office of Water infrastructure investment programs, the vast majority of products permanently incorporated into construction, maintenance, or repair projects must comply with the BABA requirements, with the exception of select construction materials (cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives), which are specifically excepted by the BABA statute.

EPA's Office of Water implements many infrastructure investment programs subject to BABA requirements, including the following:

- Alaska Native Villages and Rural Communities Water Grant Program (ANV) (and any associated Interagency Agreements with the Indian Health Service)
- Clean Water and Drinking Water State Revolving Fund Programs (CW and DWSRF)
- Clean Water and Drinking Water Grants to U.S. Territories and the District of Columbia
- Clean Water Indian and Drinking Water Tribal Infrastructure Grant Set-aside (and any associated Interagency Agreements with the Indian Health Service)
- Coastal Wetlands Planning, Protection and Restoration Act, (CWPPRA) Programs
- Congressionally Directed Spending/Community Project Funding (also known as Community Grants)
- Geographic Programs¹
- Gulf Hypoxia Program
- National Estuaries Program (CWA Section 320)

¹ Geographic Programs include: Great Lakes Restoration Initiative, Chesapeake Bay, San Francisco Bay, Puget Sound, Long Island Sound, Gulf of Mexico, South Florida, Lake Champlain, Lake Pontchartrain, Southern New England Estuaries, Columbia River Basin, Pacific Northwest

- 319 Nonpoint Source Management Program Implementation
- Reducing Lead in Drinking Water Grant Program (SDWA §1459B)
- Assistance for Small and Disadvantaged Communities Grants: Small, Underserved, and Disadvantaged Community Grant Program (SUDC), Emerging Contaminants in Small or Disadvantaged Communities (EC-SDC) and Drinking Water Infrastructure Resilience & Sustainability (SDWA §1459A)
- Sewer Overflow and Stormwater Reuse Municipal Grants (OSG)
- USMCA Implementing Legislation (Section 821 and Title IX, USMCA Supplemental Appropriations, 2020)
- U.S.-Mexico Border Water Infrastructure Program
- Voluntary School and Child Care Program Lead Testing and Remediation Grant Program (SDWA 1464(d))
- Water Infrastructure Finance and Innovation Act (WIFIA)

The questions and answers in this document apply to the implementation of BABA requirements for the Office of Water infrastructure programs listed above unless superseded by regulation, statute, or other applicable guidance. For many of the programs listed above which did not have domestic preference requirements prior to BABA, additional implementation details are pending or may be developed after the issuance of these procedures. In addition, EPA notes that more direction will be helpful to inform the determination and definition of domestic content in manufactured goods. Supplemental guidance on these and other issues, from either OMB or EPA, may be forthcoming. These implementation procedures may also apply to additional, unlisted EPA programs which may be required to apply BABA subsequent to publication of this memorandum (e.g., future funding programs which have been authorized, but not yet appropriated).

For more information on the BABA requirements, visit the EPA Office of Water’s dedicated website – <https://www.epa.gov/cwsrf/build-america-buy-america-baba> – or contact your funding authority (such as your grants officer, portfolio manager, or state contact). For information on approved waivers, visit <https://www.epa.gov/cwsrf/build-america-buy-america-baba-approved-waivers>. You may also email questions to BABA-OW@epa.gov.

This Implementation Procedures document is organized to provide responses to questions in the following topic areas:

- Section 1: General 4
- Section 2: Product Coverage 5
- Section 3: Co-funding 9
- Section 4: Waivers 10
- Section 5: Documenting Compliance 12
- Section 6: Programs with American Iron and Steel Requirements 16
- Section 7: Program-Specific Issues 17
- Appendix 1: Example Build America, Buy America (BABA) Act Construction Contract Language 22
- Appendix 2: Example Build America, Buy America (BABA) Act Assistance Agreement Language 23

QUESTIONS AND ANSWERS

SECTION 1: GENERAL

- Q1.1: Will EPA provide documentation for BABA for bid solicitations and suggested contract language? Will EPA provide suggested language for Assistance Agreements?
 - A1.1: See Appendix 1, which includes suggested language for construction contracts which addresses the BABA requirements. In addition to the language suggested in Appendix 1, EPA also recommends that assistance recipients prepare contract bid solicitation documents with a statement for the consulting engineers and construction firms as follows: “By signing payment application and recommending payment, Contractor certifies they have reviewed documentation for all products and materials submitted for payment, and the certifications are sufficient to demonstrate compliance with Build America, Buy America Act requirements.” In most cases, the assistance recipient’s representatives assume the responsibility for their clients to conduct due diligence on compliance with applicable domestic preference requirements.

All Federal Financial infrastructure assistance agreements subject to BABA must have a clause requiring compliance with the requirements. See Appendix 2 for example assistance agreement language.
- Q1.2: Would federally-financed infrastructure projects outside of the United States need to comply with the BABA requirements?
 - A1.2: No. According to the OMB Guidance (M-22-11), a “project” is defined as “...any activity related to the construction, alteration, maintenance, or repair of infrastructure in the United States.” Therefore, the BABA requirements are not implicated for infrastructure projects occurring outside of the United States, such as projects funded through the United States-Mexico-Canada Agreement with infrastructure activities occurring in Mexico or Canada (that is, outside the United States).
 -
- Q1.3: If most of the project is BABA compliant, and a small portion is not, can an assistance recipient self-fund (i.e., paying with non-federal dollars) the non-compliant products?
 - A1.3: Any project that is funded in whole or in part with federal assistance must comply with the BABA requirements, unless the requirements are otherwise waived. All iron, steel, manufactured products, and construction materials used in a project must meet the BABA requirements unless waived. Absent a waiver, there is no “small portion” or product that does not need to satisfy the BABA requirements unless the requirements are waived (or specifically excluded as is the case for cement and cementitious materials; aggregates such as stone, sand, or gravel; aggregate binding agents or additives; or non-permanent products). An assistance recipient may request a waiver or inquire as to whether a broad waiver, such as a *de minimis* waiver, might apply.

- Q1.4: How do international trade agreements affect the implementation of the BABA requirements?
 - A1.4: The BABA requirements apply in a manner consistent with United States obligations under international trade agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to these trade agreements. In general, assistance recipients are not signatories to such agreements, so these trade agreements have no impact on BABA implementation. In the few instances where such an agreement applies to a municipality, that municipality is responsible for determining its applicability and requirements and communicating with the funding authority (such as EPA and/or a state) on the actions taken to comply with BABA.

SECTION 2: PRODUCT COVERAGE

- Q2.1: For products made of iron and steel, what is the difference between predominantly and primarily iron and steel?
 - A2.1: EPA considers the terms “predominantly” and “primarily” to be interchangeable, such that a product is considered predominantly (or primarily) iron and steel if it contains greater than 50 percent iron and steel by material cost.
- Q2.2: What is the definition of construction materials (with examples)?
 - A2.2: From OMB Guidance M-22-11: “construction materials” include an article, material, or supply (other than an item of primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; aggregate binding agents or additives; or non-permanent products) that is or consists primarily of:
 - non-ferrous metals,
 - plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables), (including optic glass),
 - lumber, and
 - drywall.

For example, a plate of glass would be a construction material under BABA, but a framed window that incorporates the glass into a frame would be a manufactured product. Another common construction material for water infrastructure projects would be polyvinyl chloride (PVC) pipe and fittings. However, if PVC components are incorporated into a more complex product such as instrumentation and control equipment or a water treatment unit, those items would be manufactured products.

- Q2.3: What are manufactured products (with examples)?
 - A2.3: From OMB Guidance M-22-11: “...all manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of

the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation...”

The manufactured products category would cover the majority of potential water infrastructure products, including complex products made up of a variety of material types and components. For water infrastructure projects, common manufactured products would include, but not be limited to, pumps, motors, blowers, aerators, generators, instrumentation and control systems, gauges, meters, measurement equipment, treatment equipment, dewatering equipment, actuators, and many other mechanical and electrical items.

- Q2.4: Which category will valves fall under for BABA? Will it differ from the American Iron and Steel (AIS) requirements?
 - A2.4: For programs that are subject to BABA and AIS (SRF, WIFIA, and Community Project Funding), projects using valves should classify them as iron and steel products under BABA as long as their material cost is made up of more than 50 percent iron and/or steel. Valves with 50 percent or less iron and/or steel by material cost would be considered manufactured products under the BABA requirements.

In accordance with OMB Guidance M-22-11, an article, material, or supply should be classified into only one of the three categories: iron and steel, manufactured products, or construction materials. Under the AIS requirements, all valves made primarily of iron and steel (that is, those with iron and/or steel material cost greater than 50 percent) must comply with the AIS requirements. For BABA, EPA interprets Section IV of OMB Guidance M-22-11 to mean that iron and steel products are those items that are primarily iron and steel, the same as for the AIS requirements.

- Q2.5: Does EPA have a list of products to be classified as “Iron and Steel” under BABA?
 - A2.5: Although this list is not comprehensive, the following products were classified as AIS products if made primarily (more than 50 percent) of iron and/or steel by materials cost (for programs subject to both AIS and BABA, this list would be equivalent for “iron and steel” items or products under either requirement):

Products likely made “primarily” of iron and steel to be classified as <u>Iron and Steel</u> under BABA		
Lined and Unlined Pipe	Lined and Unlined Fittings	Tanks
Flanges	Pipe Clamps and Restraints	Structural Steel
Valves	Hydrants	Pre-Cast, Iron/Steel Reinforced Concrete (of all types, regardless of iron/steel content percentage)
Manhole Covers and other Municipal Castings	Access Hatches	Ballast Screens
Iron or Steel Benches	Bollards	Cast Bases
Cast Iron Hinged Hatches	Cast Iron Riser Rings	Catch Basin Inlets

Cleanout/Monument Boxes	Construction Covers and Frames	Curb and Corner Guards

Products likely made “primarily” of iron and steel to be classified as <u>Iron and Steel</u> under BABA		
Curb Boxes	Curb Openings	Curb Stops
Detectable Warning Plates	Downspout Shoes	Drainage Grates
Drainage Grate Frames and Curb Inlets	Inlets	Junction Boxes
Lampposts	Manhole Rings and Frames	Manhole Risers
Meter Boxes	Service Boxes	Steel Hinged Hatches
Steel Riser Rings	Trash Receptacles	Tree Grates
Tree Guards	Trench Grates	Valve Boxes
Valve Box Covers and Risers	Access Ramps	Aeration Pipes and Fittings (separate from aeration/blowers)
Angles	Backflow Preventers/Double Check Valves	Baffle Curtains
Iron or Steel Bar	Bathroom Stalls	Beam Clamps
Cable Hanging Systems	Clarifier Tanks	Coiled Steel
Column Piping	Concrete Reinforcing Bar, Wire, and Fibers	Condensate Sediment Traps
Corrugated Pipe	Couplings	Decking
Digester Covers	Dome Structures	Door Hardware
Doors	Ductwork	Expansion Joints
Expansion Tanks (diaphragm, surge, and hydropneumatics)	Fasteners	Fencing and Fence Tubing
Fire Escapes	Flanged Pipe	Flap Gates
Framing	Gate Valves	Generic Hanging Brackets
Grating	Ground Testing Boxes	Ground Test Wells
Guardrails	HVAC Registers, Diffusers, and Grilles	Joists
Knife Gates	Ladders	Lifting Hooks, J-bar, Connectors within, and Anchors for Concrete
Lockers	Man Baskets and Material Platforms	Manhole Steps
Mud Valves	Municipal Casting Junctions	Non-mechanical (aka stationary) Louvers and Dampers
Overhead Rolling Doors/ Uplifting Doors (manual open, no motor)	Pipe Connectors	Pipe Hangers
Pipe Pilings (any type of steel piling)	Pipe Spool (pipe, flanges, connectors, etc.)	Pipe Supports
Pitless Adaptors	Pre-fab Steel Buildings/Sheds (simple structure, unfurnished)	Pre-stressed Concrete Cylinder Pipe (PCCP)
Railings	Reduced Pressure Zone (RPZ) Valves	Roofing
Service Saddles	Sheet Piling	Sinks (not part of eyewash systems)
Solenoid Valves	Stairs	Static Mixers
Stationary Screens	Surface Drains	Tapping Sleeves
Telescoping Valves	Tipping Buckets	Trusses
Tubing	Valve Stem Extensions	Valve Stems (excluding handwheels and actuators)

Wall Panels	Wall Sleeves/Floor Sleeves	Welding Rods
Well Casing	Well Screens	Wire
Wire Cloth	Wire Rod	Wire Rope and Cables

Q2.6: Does EPA have a list of products that could be made “primarily” of iron and steel but would be classified as “manufactured products” under BABA?

A2.6: Although this list is not comprehensive, the following products would be considered “manufactured products” under the BABA requirements, even if the item might be composed primarily of iron and steel by materials cost (Note: These items are not subject to the AIS requirements.):

Products likely made “primarily” of iron and steel to be classified as <u>Manufactured Products</u> under BABA		
Actuator Superstructures/ Support Structures	Aeration Nozzles and Injectors	Aerators
Analytical Instrumentation	Analyzers (e.g., ozone, oxygen)	Automated Water Fill Stations
Blowers/Aeration Equipment	Boilers, Boiler Systems	Chemical Feed Systems (e.g., polymer, coagulant, treatment chemicals)
Chemical Injection Quills	Chemical Injectors	Clarifier Mechanisms/Arms
Compressors	Controls and Switches	Conveyors
Cranes	Desiccant Air Dryer Tanks	Dewatering Equipment
Dewatering Roll-offs	Disinfection Systems	Drives (e.g., variable frequency drives)
Electric/Pneumatic/Manual Accessories Used to Operate Valves (such as electric valve actuators)	Electrical Cabinetry and Housings (such as electrical boxes/enclosures)	Electrical Conduit
Electrical Junction Boxes	Electronic Door Locks	Elevator Systems (hydraulic, etc.,)
Emergency Life Systems (including eyewash stations, emergency safety showers, fire extinguishers, fire suppression systems including sprinklers /piping/valves, first aid, etc.)	Exhaust Fans	Fall Protection Anchor Points
Fiberglass Tank w/Appurtenances	Filters (and appurtenances, including underdrains, backwash systems)	Flocculators
Fluidized Bed Incinerators	Galvanized Anodes/Cathodic Protection	Gear Reducers
Generators	Geothermal Systems	Grinders
Heat Exchangers	HVAC (excluding ductwork)	HVAC Dampers (if appurtenances to aerators/blowers)
HVAC Louvers (mechanical)	Intake and Exhaust Grates (if appurtenances to aerators/blowers)	Instrumentation
Laboratory Equipment	Ladder Fall Prevention Systems	Ladder Safety Posts
Lighting Fixtures	Lightning and Grounding Rods	Mechanical or Actuated Louvers/Dampers
Membrane Bioreactor Systems	Membrane Filtration Systems	Metal Office Furniture (fixed)

Meters (including flow, wholesale, water, and service connection)	Motorized Doors (unit)	Motorized Mixers
Motorized Screens (such as traveling screens)	Motors	Pelton Wheels
Pipeline Flash Reactors (similar to injectors)	Plate Settlers	Precast Concrete without Iron/Steel Reinforcement

Products likely made “primarily” of iron and steel to be classified as <u>Manufactured Products</u> under BABA		
Furnished Pre-fab Buildings (such as furnished with pumps, mechanics inside)	Presses (including belt presses)	Pressure Gauges
Pump Cans/Barrels and Strainers	Pumps	Mechanical Rakes
Safety Climb Cable	Sampling Stations (unless also act as hydrant)	Scrubbers
Sensors	Sequencing Batch Reactors (SBR)	Steel Shelving (fixed)
Slide and Sluice Gates	Spray Header Units	Steel Cabinets (fixed interior/furniture)
Supervisory Control and Data Acquisition (SCADA) Systems	Tracer Wire	Valve Manual Gears, Actuators, Handles
Voltage Transformer	Water Electrostatic Precipitators (WESP)	Water Heaters
Weir Gates		

- Q2.7: Is asphalt paving a covered product under BABA?
 - A2.7: No. EPA interprets Section 70917(c) of the IIJA to exclude asphalt from BABA requirements. Asphalt paving is a type of concrete composed of an aggregate material mixed with a binder (bitumen). EPA considers asphalt concrete to be excluded by section 70917(c) due to its similarities with cement and cementitious materials.

SECTION 3: CO-FUNDING

- Q3.1: If projects are co-funded with funding mechanisms that don’t require BABA, must the entire project comply with BABA?
 - A3.1: Yes. Any project that is funded in whole or in part with federal assistance must comply with the BABA requirements, unless the requirements are otherwise waived. A “project” consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all the contracts and assistance agreements awarded are closely related in purpose, time, and place. This precludes the intentional splitting of projects into separate and smaller contracts or assistance agreements to avoid BABA’s applicability on some portions of a larger project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which case, separate contracts or assistance agreements would carry separate requirements.

- Q3.2: How will project requirements be determined for co-funded projects subject to potentially different general applicability/programmatic waiver conditions (such as different adjustment period waivers)?
 - A3.2: OMB Guidance M-22-11 addresses cases with project co-funding from separate programs. EPA would apply the guidance’s “cognizant” program determination to projects that are co-funded with different general applicability/programmatic waivers. For instance, if a project were co-funded between WIFIA and SRF and the majority of the Federal funding for the project is from WIFIA, then WIFIA would be the “cognizant” program for application and determination of waivers. In that case, any conditions from an applicable WIFIA waiver would apply.

SECTION 4: WAIVERS

- Q4.1: Who may apply for a waiver and how do you apply?
 - A4.1: Assistance recipients and their authorized representatives may apply for a project-specific waiver. EPA does not accept waiver requests from suppliers, distributors, or manufacturers unless the assistance recipient endorses and submits the request on its own behalf to the funding authority. In the case where multiple programs are providing federal funds to the project, the assistance recipient should submit the waiver request to the cognizant program, the one providing the greatest amount of federal funds for the project. For information on applying for cost waivers, see questions 4.4 and 4.5. For information on the SRF program roles and responsibilities, see question 7.6.

Project-specific waiver requests should generally include: (1) a brief summary of the project, (2) a description and explanation of the need for the waiver for the product(s) in question, (3) a brief summary of the due diligence conducted in search of domestic alternatives (which could include correspondence between assistance recipient and supplier/distributors), (4) the quantity and materials of the product(s) in question, (5) all engineering specifications and project design considerations relevant to the product(s) in question, (6) the approximate unit cost of items (both foreign and domestic) in addition to an estimated cost of the materials and overall project, (7) the date any products will be needed on site in order to avoid significant project schedule disruptions, and (8) any other pertinent information relevant to EPA’s consideration of the waiver (e.g., if relevant for SRF projects: whether the project is designated as an equivalency project, the date the plans and specifications were submitted to the state, the date of construction initiation, expected date of project completion, any special considerations such as local zoning and building ordinances, seismic requirements, or noise or odor control requirements).

In the case of indirect federal assistance, such as the SRF programs, the state authority reviews and conveys the waiver request to EPA. States should submit waiver requests to the appropriate program waiver request inbox. For SRF projects, please use CWSRFWaiver@epa.gov or DWSRFWaiver@epa.gov.

- Q4.2: Can an assistance recipient request a waiver based on a specification written for a specific brand or model of product (that is, a specification that names a branded item or model)?
 - A4.2: In most cases, performance-based specifications are expected and required for the majority of infrastructure projects funded by EPA's financial assistance programs. In rare cases where "branded" or product-specific sourcing may be included in project specifications, it is suggested that the specifications include the item in question (that is, not simply a catalog page, but also materials of construction, sizing, quantities, and applicable engineering performance design characteristics for the project, etc.) in addition to the standard phrase "or equal." For the purposes of product alternative market research, EPA will evaluate the BABA requirements based on performance-based engineering specifications for the product(s) in question. If the project's specifications do not include performance-based specifications, or at least an "or equal" designation, EPA will base its research on an "or equal" designation using best professional judgment to the extent practicable.
- Q4.3: If a manufactured product is not readily available domestically, will EPA provide short-term "limited availability" product waivers?
 - A4.3: EPA will address the unavailability of domestic products through the waiver process, including potential national short-term waivers for specific products, if appropriate. To the extent practicable and with the intent to maximize domestic market and supply chain development, EPA intends to address issues of broad product unavailability with targeted, time-limited, and conditional waivers, as prescribed in OMB Guidance M-22-11. EPA will follow its robust and thorough product research processes (those put into place for the AIS requirements for the SRF and WIFIA programs and expanded for the new BABA requirements) to identify and determine those products for which proposed national/general applicability waivers may be appropriate.
- Q4.4: What information is needed when applying for a cost waiver under BABA?
 - A4.4: As part of the cost waiver request, the assistance recipient must demonstrate that implementation of the BABA requirements will increase the overall project cost more than 25 percent. Depending on the circumstances of the overall project cost increases, documentation to justify the cost waiver can vary but may include itemized cost estimates or bid tabulations comparing project costs with and without BABA implementation. Assistance recipients should begin assessing the potential cost impacts of the BABA requirements during the design phase of a project.
- Q4.5: Can administrative costs associated with tracking and verification of certifications be considered when determining if the cost of a project increases by 25 percent or more?
 - A4.5: Yes. Section 70914(b)(3) of the IIJA states that a waiver may be provided if the overall

cost of the project increases by more than 25 percent due to the “inclusion of iron, steel, manufactured products, or construction materials produced in the United States.” EPA interprets this to mean that the “inclusion” of the BABA-covered products could encompass reasonable administrative costs associated with complying with the BABA requirements, such as staff, contractor, and technological resources to collect and track BABA compliance documentation.

- Q4.6: How can assistance recipients and construction contractors address product delivery delays?
 - A4.6: Assistance recipients should reasonably plan for material procurement to account for known potential supply chain issues or extended lead times and shall notify the funding authority well in advance of the issues so that prompt attention can be given to explore options. Where extended lead times for compliant products are impacting project schedules and may significantly impact construction progress, timely communication with the funding agency is important. For products that are unavailable within a reasonable timeframe to meet the objectives and schedule of a project, EPA may consider a non-availability waiver with adequate justification. An assistance recipient would need to apply for the waiver and contact its funding authority (such as EPA and/or a state) to initiate the waiver process.

SECTION 5: DOCUMENTING COMPLIANCE

- Q5.1: Who will be responsible for BABA enforcement?
 - A5.1: Responsibility for BABA implementation applies at all levels, from manufacturers to suppliers and distributors, construction contractors, assistance recipients, and funding authorities.

The manufacturers have responsibility to provide adequate and accurate documentation of the products manufactured. If suppliers and distributors are involved, they are responsible for passing along compliance documentation for products supplied to projects that are subject to the BABA requirements.

The assistance recipient and their representatives are primarily responsible for ensuring the documentation collected for products used on the project is sufficient to document compliance with the BABA requirements.

The funding authority is responsible for providing oversight and guidance as needed to ensure the proper implementation of the requirements. The Uniform Grants Guidance (UGG) (Title 2 of the Code of Federal Regulations (CFR) Part 200) applies to many Federal financial assistance agreements that will include BABA requirements. The general provisions of 2 CFR Part 200 determine the responsible party for the grant funding authority.

For information on SRF program roles and responsibilities, see question 7.6. At all levels, where fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-888- 546-8740

or OIG_Hotline@epa.gov. More information can be found at this website:
<http://www.epa.gov/oig/hotline.htm>.

- Q5.2: When will the BABA requirements be assessed for compliance? Do assistance recipients need to have waivers for potential non-domestic products before assistance agreements are in place, at the time products are procured or products are incorporated into the project (i.e., used)?
 - A5.2: Compliance is assessed where the domestic product is used (or installed) at the project site. Proper compliance documentation, whether it is a BABA certification letter or a waiver, should accompany a product prior to its “use”, in accordance with Section 70914(a) of IIJA. This may occur prior to assistance agreements being in place but is not necessary. Additionally, communication of BABA requirements through appropriate Terms and Conditions in financial assistance agreements and in project solicitation and contract documents is key in ensuring all parties involved are informed of the requirements for the project before construction is underway.
- Q5.3: How can product compliance with the BABA requirements be demonstrated?
 - A5.3: Assistance recipients and their representatives should ensure that the products delivered to the construction site are accompanied by proper documentation that demonstrate compliance with the law and be made available to the funding authority upon request. The documentation may be received and maintained in hard copy, electronically, or could be embedded in construction management software. The use of a signed certification letter for the project is the most direct and effective form of compliance documentation for ensuring products used on site are BABA-compliant prior to their installation; however, other forms of documentation are also acceptable as long as collectively, the following can be demonstrated:
 - (1) Documentation linked to the project. For example, this can be in the form of the project name, project location, contract number, or project number.
 - (2) Documentation linked to the product used on the project. For example, description of product(s) (simple explanation sufficient to identify the product(s)), or an attached (or electronic link to) purchase order, invoice, or bill of lading.
 - (3) Documentation includes statement attesting that the products supplied to the assistance recipient are compliant with BABA requirement. Reference to the Infrastructure Investment and Jobs Act (“IIJA”) or the Bipartisan Infrastructure Law (BIL) are also acceptable. For iron and steel items under BABA, references to the American Iron and Steel (AIS) requirements are also acceptable and reciprocal with BABA for such items.
 - (4) Documentation that manufacturing occurred in the United States, which could include, for example, the location(s) of manufacturing for each manufacturing step that is being certified. It is acceptable for manufactured products to note a single point of manufacturing, documenting that the final point of manufacturing is in the United States. Note that each BABA category may require different determinations for

compliance.

- (5) Signature of company representative (on company letterhead and signature can be electronic). The signatory of the certifying statement affirms their knowledge of the manufacturing processes for the referenced product(s) and attests that the product meets the BABA requirements.

In addition to compliance documentation, assistance recipients or their representatives should also conduct a visual inspection of the product when it arrives to the project site, especially for iron and steel products which are often stamped with the country of origin. (Note: A country of origin stamp alone is not sufficient verification of compliance with BABA and assistance receipts should not rely on it to ensure compliance.)

EPA may develop alternative procedures for demonstrating compliance. Additional project- or program-specific instructions may be developed on a case-by-case basis in order to meet individual circumstances.

- Q5.4: Will EPA provide a form or template for tracking and documenting compliance?
- A5.4: EPA does not require a specified format for tracking or documenting compliance. Assistance recipients are free to develop any system (from simple to complex software) for tracking items used on the project and the accompanying compliance documentation, e.g., certification letters, applicable waivers, if it helps with implementation and compliance. Elements that may help with keeping track of compliance may include: product description, quantity required/used, product category (i.e., iron and steel, manufactured product, or construction material), status of obtaining certification letter, product cost, and whether the item might qualify as *de minimis*, or qualify under another applicable waiver.
- Q5.5: If a manufacturer claims to comply with the Buy American Act, does it also comply with BABA?
 - A5.5: No. With the exception of the AIS requirements – which EPA interprets to be equivalent to the “iron and steel” requirements under BABA – EPA does not have an interpretation about the comparability of other domestic preference requirements relative to BABA. Any products that are to be certified as compliant with BABA should include a specific reference to the BABA requirements and appropriate attestation from a responsible manufacturing company official. See Question 5.3 for EPA’s recommendations for BABA certification letters.
- Q5.6: How will assistance recipients manage certification letters for hundreds, possibly thousands of products?

A5.6: EPA recognizes that the new BABA requirements will cover most products used in typical water and wastewater infrastructure projects, and that the number of items which may require certification at large and/or complex projects may reach several hundred. EPA is concerned about the potential administrative burden that this would place on assistance recipients. EPA recommends that projects with a high number of potentially covered

products meet with their funding authority about potential compliance strategies to minimize burden and streamline compliance activity. Assistance recipients should prepare contract bid solicitation documents with a statement for the consulting engineers and construction firms as follows: “By signing payment application and recommending payment, Contractor certifies they have reviewed documentation for all products and materials submitted for payment, and the documentation is sufficient to demonstrate compliance with Build America, Buy America Act requirements.” In most cases, the assistance recipient’s representatives may assume the responsibility for their clients to conduct due diligence on compliance with applicable domestic preference requirements.

- Q5.7: Who is responsible for documenting the 55 percent content requirement for manufactured products under BABA? What if the final manufacturer cannot trace or verify domestic origin for all components?
 - A5.7: The manufacturer who signs a certification letter is responsible for documenting compliance with any of the three categories of products (iron and steel, manufactured products, or construction materials). For manufactured products, BABA requires that greater than 55 percent of the total cost of all components of the manufactured product be from domestic sources. EPA recommends that the certification letter for manufactured products document whether the item passes the content test in the final product along with a statement attesting to compliance with the BABA requirements for manufactured products.
- Q5.8: How do final product fabricators document compliance when the final step of manufacturing may be simply assembling components?
 - A5.8: It is acceptable, in many cases, especially for highly complex manufactured products that utilize many sub-components, for the final point of assembly to certify without using a “step certification” process. Multiple certifications (i.e., step certifications) or a singular certification can be used for a product, as long as the certifying official is willing to attest to the product’s compliance with BABA requirements at all stages of manufacturing.
- Q5.9: Will Material Test Reports be acceptable in lieu of a BABA certification for iron and steel?
 - A5.9: Material Test Reports (MTRs, commonly referred to as “Mill Certifications” or “Mill Certs”) provide the chemical composition of steel and iron from a mill or foundry. If an MTR accompanies the delivery of steel or iron to a project site with an invoice or bill of lading, EPA will consider it sufficient to demonstrate compliance (equivalent to a certification letter) as long as the MTR includes a manufacturer representative’s signature in addition to the location (city and state) of the mill/foundry. It is common for MTRs to be the first letter in a “step certification” if the product is further fabricated or painted, etc., by another manufacturer.
- Q5.10: Can a manufacturer use a fillable certification letter for products?

- A5.10: EPA recommends that certifications be signed by representatives of the manufacturing entity. EPA does not oppose manufacturers using forms to internally develop letters within their company, thereby providing signed, non-manipulable certification letters to suppliers, distributors, and/or assistance recipients. A fillable form that can be changed by someone outside of the manufacturer after signature does not demonstrate compliance and may create compliance concerns for the manufacturer or assistance recipient.
- Q5.11: Are product certifications from suppliers and distributors allowed?
 - A5.11: EPA recommends that representatives of product manufacturers certify compliance and discourages suppliers and distributors from creating certification letters. EPA does not rule out the possibility that a third-party certification process, such as a certification by a distributor, may be viable. However, EPA is currently not aware of a system or proposed system that meets the EPA's recommendations for documentation of product certification.
- Q5.12: How long should assistance recipients keep compliance documentation?
 - A5.12: Assistance recipients should apply recordkeeping requirements for the project according to the procedures dictated by the funding authority. For most EPA grant programs, this is prescribed in the UGG at 2 CFR 200.334-200.338; e.g., the SRF programs require a minimum of three years. Other funding programs may require longer documentation retention periods.

SECTION 6: PROGRAMS WITH AMERICAN IRON AND STEEL REQUIREMENTS

- Q6.1: Does BABA supersede the American Iron and Steel (AIS) Requirements?
 - A6.1: The BABA requirements for items considered "iron and steel" are equivalent to those for covered iron and steel products under the AIS requirements in the Clean Water Act and the Safe Drinking Water Act. These requirements apply to the CWSRF, DWSRF, WIFIA, and Water infrastructure Community Grants. BABA includes a "Savings Provision" (Section 70917(b)) that states that BABA does not affect existing domestic content procurement preferences for infrastructure projects funded by Federal financial assistance programs that meet the requirements of section 70914. EPA views the AIS requirements as meeting the "iron and steel" product requirements of BABA Section 70914, as they both include the key requirement that items made of iron and steel be wholly manufactured in the United States from the point of melting and/or pouring the iron or steel components through final manufacturing step. Because of the "Savings Provision" of Section 70917, the AIS requirements satisfy the "iron and steel" requirements of BABA. For the programs that have AIS requirements, EPA intends to implement BABA requirements the same way for iron and steel items as it has done for AIS products.

- Q6.2: For iron and steel products, does a manufacturer need to demonstrate compliance from initial melting through the finished product?
 - A6.2: For iron and steel products, the BABA requirements are the same as the existing AIS requirements, in that all of the iron and steel in a covered product (that is, the product is comprised of more than 50 percent iron and steel by material cost) must be melted and poured in the United States and all subsequent manufacturing processes (such as grinding, rolling, bending, reheating, and casting) must occur in the United States.

Q6.3: Will EPA apply the same manufacturing standards for BABA iron and steel products as for the American Iron and Steel (AIS) requirements?

- A6.3: Yes. For AIS, EPA did not require raw materials used in the production of steel or iron to be domestically sourced. For BABA, EPA interprets the requirements to be the same. Hence, like AIS, raw materials in the production of iron and steel subject to BABA requirements would not need to be domestically sourced. The key step for both AIS and BABA domestic iron and/or steel production is the melting/pouring (that is, the location of the furnace), which must be in the United States.
- Q6.4: Will the certification process be similar to the process established for the American Iron and Steel requirements?
 - A6.4: EPA expects the certification process for the BABA requirements to be very similar to that established for the AIS requirements. For iron and steel products, the process should remain the same for AIS and BABA. EPA recommends for manufactured products and for construction materials that certification letters include direct reference to the product/material content requirements under BABA, in addition to an affirmative statement verifying that the product meets the BABA requirements.
- Q6.5: Will duplicate certification letters be required for AIS and BABA for iron/steel products?
 - A6.5: No. Compliance with BABA requirements will be sufficient to demonstrate compliance with AIS requirements for iron and steel products. If a project is subject to BABA, the only demonstration of compliance necessary is with the BABA requirements, of which the iron and steel requirements are equivalent to those of the AIS statutory requirements: the iron or steel in a product made primarily or predominantly of iron and steel (comprising more than 50 percent iron and steel by material cost) must be melted and/or poured in the United States and all subsequent manufacturing processes must occur in the United States.

SECTION 7: PROGRAM-SPECIFIC ISSUES

- Q7.1.: How do the BABA requirements apply to Community Grants?
 - A7.1: The Community Project Funding/Congressionally Directed Spending grants for the construction of drinking water, wastewater, and stormwater infrastructure and for water

quality protection are subject to the requirements specified in the explanatory statement accompanying the Consolidated Appropriations Act (Explanatory Statement for Division G of P.L. 117-13, the Consolidated Appropriations Act of 2022). The explanatory statement asserts: “Applicable Federal requirements that would apply to a Clean Water State Revolving Fund or Drinking Water State Revolving Fund project grant recipient shall apply to a grantee receiving a CPF grant under this section.” Therefore, the federally funded Community Project Funding/Congressionally Directed Spending grants are subject to the same requirements that apply to CWSRF or DWSRF projects, including BABA and AIS requirements. See also A1.2.

- Q7.2: Should SRF projects covered by the BABA SRF Projects Design Planning Adjustment Period Waiver follow the same procedures for demonstrating compliance as outlined for American Iron and Steel requirements?
 - A7.2: Yes. The SRF Design Planning Adjustment Period waiver does not waive the iron and steel requirements under BABA. The SRF programs have existing domestic preference requirements for SRF projects under CWA Section 608 and SDWA Section 1452(a)(4) (AIS requirements) to use iron and steel products that are produced in the United States. Sections 70917(a) and (b) of BIL explain the application of BABA to existing domestic preference requirements. Specifically, the savings provision in Section 70917(b) states that existing domestic preference requirements that meet BABA requirements are not affected by BABA. The statutory AIS requirements were existing at the time BABA became law and satisfy the BABA iron and steel requirements. Therefore, the statutory AIS requirements that have previously applied to SRF-funded projects will continue to do so, and compliance with AIS requirements will satisfy the BABA iron and steel requirements. Demonstration of compliance for iron and steel products will follow the AIS implementation policies for projects subject to the waiver.
- Q7.3: For SRF programs, is BABA considered a federal cross-cutting authority? (i.e., do “equivalency” rules apply?)
 - A7.3: Yes, BABA is considered a federal cross-cutting requirement that applies to SRF assistance equivalent to the federal capitalization grant (i.e., “equivalency” projects). EPA’s SRF regulations at 40 CFR 35.3145 and 35.3575 require states and recipients of SRF funds equivalent to the amount of the federal capitalization grant to comply with federal cross-cutting requirements. Section 70914 of the IIJA, which states when a Buy America preference applies, explains that “none of the funds made available for a Federal financial assistance program for infrastructure...may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States.” Therefore, BABA only applies to projects funded in an amount equivalent to the federal capitalization grant and not to those projects receiving funds in excess of the capitalization grant (i.e., “non-equivalency” projects). (Note: The AIS requirements continue to apply for all SRF projects, including non-equivalency projects, and all WIFIA and Community Grant projects, because equivalency does not apply.)

- Q7.4: Do the BABA requirements apply to Drinking Water State Revolving Fund set-asides?
 - A7.4: Due to requirements related to the deposit of funds in the DWSRF program, almost all of the funds used to conduct set-aside activities are Federal dollars. Therefore, Federal cross-cutting requirements must be applied to all set-aside activities. However, in the case of most set-aside activities, the cross-cutting requirements will not be implicated because of the nature of the activities conducted under the set-asides. Because the BABA requirements only apply to infrastructure, and infrastructure typically is not an eligible set-aside expenditure (with one potential exception being loans for incentive-based source water protection measures under the Local Assistance and Other State Programs Set-Aside), the BABA requirements will not apply to most set-aside activities.
- Q7.5: What if an SRF project is refinanced using Federal financial assistance on or after May 14, 2022?
 - A7.5: If an SRF project began construction, financed from another funding source, prior to May 14, 2022, but is refinanced through an assistance agreement executed on or after that date, BABA requirements will apply to all construction that occurs on or after May 14, 2022, through completion of construction, unless a waiver applies. There is no retroactive application of the BABA requirements where a refinancing occurs for an SRF project that has completed construction prior to May 14, 2022. (Note: If SRF funding is used for the refinancing, the AIS requirements may still apply depending on the timing of construction.)
- Q7.6: What are the roles and responsibilities for SRF programs for BABA implementation?
 - A7.6: Implementation of the BABA requirements for the State Revolving Fund programs will continue the roles and responsibilities from the successful AIS implementation process.

As with AIS, it is both the assistance recipient's and the state's responsibility to ensure compliance with the BABA requirements. The state is the recipient of a federal capitalization grant and must comply with all grant conditions, including a condition requiring adherence to BABA requirements.

Consequently, states are strongly advised to conduct site visits of projects during construction and review documentation demonstrating the assistance recipient's proof of compliance. In EPA's experience, most states conduct periodic site visits and arrange timely meetings with funded projects. Observed best practices typically include a meeting early in the process (sometimes before bid and usually prior to commencing construction) and at least one project site visit during the construction process. Assistance recipients must maintain documentation of compliance with the BABA requirements, as explained in question 5.3. The documents must be kept by the assistance recipient and should be reviewed by the state during project reviews.

The state's role in the waiver process is to review any waiver requests submitted to the state to ensure that all necessary information has been provided by the assistance recipient prior to forwarding the request to EPA. If a state finds the request lacking, the state should work with

the assistance recipient to help obtain complete information. Question 4.1 explains the information needed by EPA to expediently review a waiver request.

In order to implement the BABA requirements, EPA has developed an approach for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow states, on behalf of the assistance recipients, to apply for waivers of the BABA requirements directly to EPA Headquarters. Only waiver requests received and/or endorsed from states will be considered. Pursuant to BABA, EPA has the responsibility to make findings as to the issuance of waivers to the BABA requirements.

Step-by-step SRF Waiver Process

The waiver process begins with the assistance recipient. To fulfill the BABA requirements, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American-made iron and steel, manufactured goods, and construction materials. It is essential that the assistance recipient include the BABA terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 2 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three statutory conditions is demonstrated to EPA and approved.

To apply for a project-specific waiver, the assistance recipient should email the request in the form of a Word document (.doc) or editable PDF (.pdf) to the funding program. It is strongly recommended that each state identify a person or persons for BABA communications. The state designee(s) will review the application for the waiver and determine whether the necessary information has been included (Note: More information may be provided in the future regarding what information is required to be included in waiver requests). Once the waiver application is complete, the designee (State) will forward the application to the EPA for review.

Evaluation by EPA

After receiving an application for waiver of the BABA requirements and ensuring sufficient information was provided, EPA will publish the request on its website for 15 days and receive public comment. EPA will then determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the state designee whether a waiver request has been approved or not approved as soon as such a decision has been made. Granting such a waiver is a four-step process:

1. Research – After receiving an application for a waiver, EPA will perform market research to determine whether the iron, steel, manufactured goods, or construction materials are available domestically.
2. Posting – After research, if no domestic product has been identified, EPA is required to

publish the application and all material submitted with the application on EPA's website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at:
<https://www.epa.gov/cwsrf/build-america-buy-america-baba-waivers-open-public-comment>.

3. Evaluation – After receiving an application for waiver of the BABA requirements, EPA will determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver to determine whether or not to grant the waiver.

4. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program and post the signed waiver on the Agency's website. The assistance recipient should keep a copy of the signed waiver in its project files.

(Note: Additional steps may be required in the future regarding the waiver process depending on additional guidance from OBM) APPENDIX 1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 20 2014

OFFICE OF WATER

MEMORANDUM

SUBJECT: Implementation of American Iron and Steel provisions of P.L. 113-76,
Consolidated Appropriations Act, 2014

FROM: f (Andrew D. Sawyers, Director C.
1) Office of Wastewater Management (4201M)

Peter C. Grevatt, Director
Office of Ground Water and Drinking Water (4601M)

TO: Water Management Division Directors
Regions I - X

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel (AIS)" requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use iron and steel products that are produced in the United States for projects for the construction, alteration, maintenance, or repair of a public water system or treatment works if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Federal Fiscal Year 2014.

Section 436 also sets forth certain circumstances under which EPA may waive the AIS requirement. Furthermore, the Act specifically exempts projects where engineering plans and specifications were approved by a State agency prior to January 17, 2014.

The approach described below explains how EPA will implement the AIS requirement. The first section is in the form of questions and answers that address the types of projects that must comply with the AIS requirement, the types of products covered by the AIS requirement, and compliance. The second section is a step-by-step process for requesting waivers and the circumstances under which waivers may be granted.

Implementation

The Act states:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) finds that—

(1) applying subsection (a) would be inconsistent with the public interest;

(2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or

(3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

(d) This section shall be applied in a manner consistent with United States obligations under international agreements.

(e) The Administrator may retain up to 0.25 percent of the funds appropriated in this Act for the Clean and Drinking Water State Revolving Funds for carrying out

the provisions described in subsection (a)(1) for management and oversight of the requirements of this section.

(f) This section does not apply with respect to a project if a State agency approves the engineering plans and specifications for the project, in that agency's capacity to approve such plans and specifications prior to a project requesting bids, prior to the date of the enactment of this Act.

The following questions and answers provide guidance for implementing and complying with the AIS requirements:

Project Coverage

1) What classes of projects are covered by the AIS requirement?

All treatment works projects funded by a CWSRF assistance agreement, and all public water system projects funded by a DWSRF assistance agreement, from the date of enactment through the end of Federal Fiscal Year 2014, are covered. The AIS requirements apply to the entirety of the project, no matter when construction begins or ends. Additionally, the AIS requirements apply to all parts of the project, no matter the source of funding.

2) Does the AIS requirement apply to nonpoint source projects or national estuary projects?

No. Congress did not include an AIS requirement for nonpoint source and national estuary projects unless the project can also be classified as a 'treatment works' as defined by section 212 of the Clean Water Act.

3) Are any projects for the construction, alteration, maintenance, or repair of a public water system or treatment works excluded from the AIS requirement?

Any project, whether a treatment works project or a public water system project, for which engineering plans and specifications were approved by the responsible state agency prior to January 17, 2014, is excluded from the AIS requirements.

4) What if the project does not have approved engineering plans and specifications but has signed an assistance agreement with a CWSRF or DWSRF program prior to January 17, 2014?

The AIS requirements do not apply to any project for which an assistance agreement was signed prior to January 17, 2014.

5) What if the project does not have approved engineering plans and specifications, but bids were advertised prior to January 17, 2014 and an assistance agreement was signed after January 17, 2014?

If the project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the approval date for purposes of the exemption in section 436(f).

6) What if the assistance agreement that was signed prior to January 17, 2014, only funded a part of the overall project, where the remainder of the project will be funded later with another SRF loan?

If the original assistance agreement funded any construction of the project, the date of the original assistance agreement counts for purposes of the exemption. If the original assistance agreement was only for planning and design, the date of that assistance agreement will count for purposes of the exemption only if there is a written commitment or expectation on the part of the assistance recipient to fund the remainder of the project with SRF funds.

7) What if the assistance agreement that was signed prior to January 17, 2014, funded the first phase of a multi-phase project, where the remaining phases will be funded by SRF assistance in the future?

In such a case, the phases of the project will be considered a single project if all construction necessary to complete the building or work, regardless of the number of contracts or assistance agreements involved, are closely related in purpose, time and place. However, there are many situations in which major construction activities are clearly undertaken in phases that are distinct in purpose, time, or place. In the case of distinct phases, projects with engineering plans and specifications approval or assistance agreements signed prior to January 17, 2014 would be excluded from AIS requirements while those approved/signed on January 17, 2014, or later would be covered by the AIS requirements.

8) What if a project has split funding from a non-SRF source?

Many States intend to fund projects with “split” funding, from the SRF program and from State or other programs. Based on the Act language in section 436, which requires that American iron and steel products be used in any project for the construction, alteration, maintenance, or repair of a public water system or treatment works receiving SRF funding between and including January 17, 2014 and September 30, 2014, any project that is funded in whole or in part with such funds must comply with the AIS requirement. A “project” consists of all construction necessary to complete the building or work regardless of the number of contracts or assistance agreements involved so long as all contracts and assistance agreements awarded are closely related in purpose, time and place. This precludes the intentional splitting of SRF projects into separate and smaller contracts or assistance agreements to avoid AIS coverage on some portion of a larger project, particularly where the activities are integrally and proximately related to the whole. However, there are many situations in which major construction activities are clearly undertaken in separate phases that are distinct in purpose, time, or place, in which

case, separate contracts or assistance agreement for SRF and State or other funding would carry separate requirements.

9) What about refinancing?

If a project began construction, financed from a non-SRF source, prior to January 17, 2014, but is refinanced through an SRF assistance agreement executed on or after January 17, 2014 and prior to October 1, 2014, AIS requirements will apply to all construction that occurs on or after January 17, 2014, through completion of construction, unless, as is likely, engineering plans and specifications were approved by a responsible state agency prior to January 17, 2014. There is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to January 17, 2014.

10) Do the AIS requirements apply to any other EPA programs, besides the SRF program, such as the Tribal Set-aside grants or grants to the Territories and DC?

No, the AIS requirement only applies to funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12)

Covered Iron and Steel Products

11) What is an iron or steel product?

For purposes of the CWSRF and DWSRF projects that must comply with the AIS requirement, an iron or steel product is one of the following made primarily of iron or steel that is permanently incorporated into the public water system or treatment works:

- Lined or unlined pipes or fittings;
- Manhole Covers;
- Municipal Castings (defined in more detail below);
- Hydrants;
- Tanks;
- Flanges;
- Pipe clamps and restraints;
- Valves;
- Structural steel (defined in more detail below);
- Reinforced precast concrete; and
- Construction materials (defined in more detail below).

12) What does the term ‘primarily iron or steel’ mean?

‘Primarily iron or steel’ places constraints on the list of products above. For one of the listed products to be considered subject to the AIS requirements, it must be made of greater than 50% iron or steel, measured by cost. The cost should be based on the material costs.

13) Can you provide an example of how to perform a cost determination?

For example, the iron portion of a fire hydrant would likely be the bonnet, body and shoe, and the cost then would include the pouring and casting to create those components. The other material costs would include non-iron and steel internal workings of the fire hydrant (i.e., stem, coupling, valve, seals, etc). However, the assembly of the internal workings into the hydrant body would not be included in this cost calculation. If one of the listed products is not made primarily of iron or steel, United States (US) provenance is not required. An exception to this definition is reinforced precast concrete, which is addressed in a later question.

14) If a product is composed of more than 50% iron or steel, but is not listed in the above list of items, must the item be produced in the US? Alternatively, must the iron or steel in such a product be produced in the US?

The answer to both question is no. Only items on the above list must be produced in the US. Additionally, the iron or steel in a non-listed item can be sourced from outside the US.

15) What is the definition of steel?

Steel means an alloy that includes at least 50 percent iron, between .02 and 2 percent carbon, and may include other elements. Metallic elements such as chromium, nickel, molybdenum, manganese, and silicon may be added during the melting of steel for the purpose of enhancing properties such as corrosion resistance, hardness, or strength. The definition of steel covers carbon steel, alloy steel, stainless steel, tool steel and other specialty steels.

16) What does ‘produced in the United States’ mean?

Production in the United States of the iron or steel products used in the project requires that all manufacturing processes, including application of coatings, must take place in the United States, with the exception of metallurgical processes involving refinement of steel additives. All manufacturing processes includes processes such as melting, refining, forming, rolling, drawing, finishing, fabricating and coating. Further, if a domestic iron and steel product is taken out of the US for any part of the manufacturing process, it becomes foreign source material. However, raw materials such as iron ore, limestone and iron and steel scrap are not covered by the AIS requirement, and the material(s), if any, being applied as a coating are similarly not covered. Non-iron or steel components of an iron and steel product may come from non-US sources. For example, for products such as valves and hydrants, the individual non-iron and steel components

do not have to be of domestic origin.

17) Are the raw materials used in the production of iron or steel required to come from US sources?

No. Raw materials, such as iron ore, limestone, scrap iron, and scrap steel, can come from non-US sources.

18) If an above listed item is primarily made of iron or steel, but is only at the construction site temporarily, must such an item be produced in the US?

No. Only the above listed products made primarily of iron or steel, permanently incorporated into the project must be produced in the US. For example trench boxes, scaffolding or equipment, which are removed from the project site upon completion of the project, are not required to be made of U.S. Iron or Steel.

19) What is the definition of ‘municipal castings’?

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are:

- Access Hatches;
- Ballast Screen;
- Benches (Iron or Steel);
- Bollards;
- Cast Bases;
- Cast Iron Hinged Hatches, Square and Rectangular;
- Cast Iron Riser Rings;
- Catch Basin Inlet;
- Cleanout/Monument Boxes;
- Construction Covers and Frames;
- Curb and Corner Guards;
- Curb Openings;
- Detectable Warning Plates;
- Downspout Shoes (Boot, Inlet);
- Drainage Grates, Frames and Curb Inlets;
- Inlets;
- Junction Boxes;
- Lampposts;
- Manhole Covers, Rings and Frames, Risers;

Meter Boxes;
Service Boxes;
Steel Hinged Hatches, Square and Rectangular;
Steel Riser Rings;
Trash receptacles;
Tree Grates;
Tree Guards;
Trench Grates; and
Valve Boxes, Covers and Risers.

20) What is ‘structural steel’?

Structural steel is rolled flanged shapes, having at least one dimension of their cross-section three inches or greater, which are used in the construction of bridges, buildings, ships, railroad rolling stock, and for numerous other constructional purposes. Such shapes are designated as wide-flange shapes, standard I-beams, channels, angles, tees and zees. Other shapes include H-piles, sheet piling, tie plates, cross ties, and those for other special purposes.

21) What is a ‘construction material’ for purposes of the AIS requirement?

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered “structural steel”. This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

22) What is not considered a ‘construction material’ for purposes of the AIS requirement?

Mechanical and electrical components, equipment and systems are not considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system.

The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters,

heat exchangers, generators, cabinetry and housings (such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

23) If the iron or steel is produced in the US, may other steps in the manufacturing process take place outside of the US, such as assembly?

No. Production in the US of the iron or steel used in a listed product requires that all manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

24) What processes must occur in the US to be compliant with the AIS requirement for reinforced precast concrete?

While reinforced precast concrete may not be at least 50% iron or steel, in this particular case, the reinforcing bar and wire must be produced in the US and meet the same standards as for any other iron or steel product. Additionally, the casting of the concrete product must take place in the US. The cement and other raw materials used in concrete production are not required to be of domestic origin.

If the reinforced concrete is cast at the construction site, the reinforcing bar and wire are considered to be a construction material and must be produced in the US.

Compliance

25) How should an assistance recipient document compliance with the AIS requirement?

In order to ensure compliance with the AIS requirement, specific AIS contract language must be included in each contract, starting with the assistance agreement, all the way down to the purchase agreements. Sample language for assistance agreements and contracts can be found in Appendix 3 and 4.

EPA recommends the use of a step certification process, similar to one used by the Federal Highway Administration. The step certification process is a method to ensure that producers adhere to the AIS requirement and assistance recipients can verify that products comply with the AIS requirement. The process also establishes accountability and better enables States to take enforcement actions against violators.

Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. A step certification is a process under which each handler (supplier, fabricator, manufacturer,

processor, etc) of the iron and steel products certifies that their step in the process was domestically performed. Each time a step in the manufacturing process takes place, the manufacturer delivers its work along with a certification of its origin. A certification can be quite simple. Typically, it includes the name of the manufacturer, the location of the manufacturing facility where the product or process took place (not its headquarters), a description of the product or item being delivered, and a signature by a manufacturer's responsible party. Attached, as Appendix 5, are sample certifications. These certifications should be collected and maintained by assistance recipients.

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the US. While this type of certification may be acceptable, it may not provide the same degree of assurance. Additional documentation may be needed if the certification is lacking important information. Step certification is the best practice.

26) How should a State ensure assistance recipients are complying with the AIS requirement?

In order to ensure compliance with the AIS requirement, States SRF programs must include specific AIS contract language in the assistance agreement. Sample language for assistance agreements can be found in Appendix 3.

States should also, as a best practice, conduct site visits of projects during construction and review documentation demonstrating proof of compliance which the assistance recipient has gathered.

27) What happens if a State or EPA finds a non-compliant iron and/or steel product permanently incorporated in the project?

If a potentially non-compliant product is identified, the State should notify the assistance recipient of the apparent unauthorized use of the non-domestic component, including a proposed corrective action, and should be given the opportunity to reply. If unauthorized use is confirmed, the State can take one or more of the following actions: request a waiver where appropriate; require the removal of the non-domestic item; or withhold payment for all or part of the project. Only EPA can issue waivers to authorize the use of a non-domestic item. EPA may use remedies available to it under the Clean Water Act, the Safe Drinking Water Act, and 40 CFR part 31 grant regulations, in the event of a violation of a grant term and condition.

It is recommended that the State work collaboratively with EPA to determine the appropriate corrective action, especially in cases where the State is the one who identifies the item in noncompliance or there is a disagreement with the assistance recipient.

If fraud, waste, abuse, or any violation of the law is suspected, the Office of Inspector General (OIG) should be contacted immediately. The OIG can be reached at 1-888-546-8740 or OIG_Hotline@epa.gov. More information can be found at this website: <http://www.epa.gov/oig/hotline.htm>.

28) How do international trade agreements affect the implementation of the AIS requirements?

The AIS provision applies in a manner consistent with United States obligations under international agreements. Typically, these obligations only apply to direct procurement by the entities that are signatories to such agreements. In general, SRF assistance recipients are not signatories to such agreements, so these agreements have no impact on this AIS provision. In the few instances where such an agreement applies to a municipality, that municipality is under the obligation to determine its applicability and requirements and document the actions taken to comply for the State.

Waiver Process

The statute permits EPA to issue waivers for a case or category of cases where EPA finds (1) that applying these requirements would be inconsistent with the public interest; (2) iron and steel products are not produced in the US in sufficient and reasonably available quantities and of a satisfactory quality; or (3) inclusion of iron and steel products produced in the US will increase the cost of the overall project by more than 25 percent.

In order to implement the AIS requirements, EPA has developed an approach to allow for effective and efficient implementation of the waiver process to allow projects to proceed in a timely manner. The framework described below will allow States, on behalf of the assistance recipients, to apply for waivers of the AIS requirement directly to EPA Headquarters. Only waiver requests received from states will be considered. Pursuant to the Act, EPA has the responsibility to make findings as to the issuance of waivers to the AIS requirements.

Definitions

The following terms are critical to the interpretation and implementation of the AIS requirements and apply to the process described in this memorandum:

Reasonably Available Quantity: The quantity of iron or steel products is available or will be available at the time needed and place needed, and in the proper form or specification as specified in the project plans and design.

Satisfactory Quality: The quality of iron or steel products, as specified in the project plans and designs.

Assistance Recipient: A borrower or grantee that receives funding from a State CWSRF or DWSRF program.

Step-By-Step Waiver Process

Application by Assistance Recipient

Each local entity that receives SRF water infrastructure financial assistance is required by section 436 of the Act to use American made iron and steel products in the construction of its project. However, the recipient may request a waiver. Until a waiver is granted by EPA, the AIS requirement stands, except as noted above with respect to municipalities covered by international agreements.

The waiver process begins with the SRF assistance recipient. In order to fulfill the AIS requirement, the assistance recipient must in good faith design the project (where applicable) and solicit bids for construction with American made iron and steel products. It is essential that the assistance recipient include the AIS terms in any request for proposals or solicitations for bids, and in all contracts (see Appendix 3 for sample construction contract language). The assistance recipient may receive a waiver at any point before, during, or after the bid process, if one or more of three conditions is met:

1. Applying the American Iron and Steel requirements of the Act would be inconsistent with the public interest;
2. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
3. Inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Proper and sufficient documentation must be provided by the assistance recipient. A checklist detailing the types of information required for a waiver to be processed is attached as Appendix 1.

Additionally, it is strongly encouraged that assistance recipients hold pre-bid conferences with potential bidders. A pre-bid conference can help to identify iron and steel products needed to complete the project as described in the plans and specifications that may not be available from domestic sources. It may also identify the need to seek a waiver prior to bid, and can help inform the recipient on compliance options.

In order to apply for a project waiver, the assistance recipient should email the request in the form of a Word document (.doc) to the State SRF program. It is strongly recommended that the State designate a single person for all AIS communications. The State SRF designee will review the application for the waiver and determine whether the necessary information has been included. Once the waiver application is complete, the State designee will forward the application to the EPA for review.

Evaluation by EPA

After receiving an application for waiver of the AIS requirements, EPA Headquarters will publish the request on its website for 15 days and receive informal comment. EPA Headquarters will then use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to

determine whether or not to grant the waiver.

In the event that EPA finds that adequate documentation and justification has been submitted, the Administrator may grant a waiver to the assistance recipient. EPA will notify the State designee that a waiver request has been approved or denied as soon as such a decision has been made. Granting such a waiver is a three-step process:

1. Posting – After receiving an application for a waiver, EPA is required to publish the application and all material submitted with the application on EPA’s website for 15 days. During that period, the public will have the opportunity to review the request and provide informal comment to EPA. The website can be found at: http://water.epa.gov/grants_funding/aisrequirement.cfm
2. Evaluation – After receiving an application for waiver of the AIS requirements, EPA Headquarters will use the checklist in Appendix 2 to determine whether the application properly and adequately documents and justifies the statutory basis cited for the waiver – that it is quantitatively and qualitatively sufficient – and to determine whether or not to grant the waiver.
3. Signature of waiver approval by the Administrator or another agency official with delegated authority – As soon as the waiver is signed and dated, EPA will notify the State SRF program, and post the signed waiver on our website. The assistance recipient should keep a copy of the signed waiver in its project files.

Public Interest Waivers

EPA has the authority to issue public interest waivers. Evaluation of a public interest waiver request may be more complicated than that of other waiver requests so they may take more time than other waiver requests for a decision to be made. An example of a public interest waiver that might be issued could be for a community that has standardized on a particular type or manufacturer of a valve because of its performance to meet their specifications. Switching to an alternative valve may require staff to be trained on the new equipment and additional spare parts would need to be purchased and stocked, existing valves may need to be unnecessarily replaced, and portions of the system may need to be redesigned. Therefore, requiring the community to install an alternative valve would be inconsistent with public interest.

EPA also has the authority to issue a public interest waiver that covers categories of products that might apply to all projects.

EPA reserves the right to issue national waivers that may apply to particular classes of assistance recipients, particular classes of projects, or particular categories of iron or steel products. EPA may develop national or (US geographic) regional categorical waivers through the identification of similar circumstances in the detailed justifications presented to EPA in a waiver request or requests. EPA may issue a national waiver based on policy decisions regarding the public's interest or a determination that a particular item is not produced domestically in reasonably available quantities or of a sufficient quality. In such cases, EPA may determine it is necessary to issue a national waiver.

If you have any questions concerning the contents of this memorandum, you may contact us, or have your staff contact Jordan Dorfman, Attorney-Advisor, State Revolving Fund Branch, Municipal Support Division, at dorfman.jordan@epa.gov or (202) 564-0614 or Kiri Anderer, Environmental Engineer, Infrastructure Branch, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

Attachments

Appendix 1: Information Checklist for Waiver Request

The purpose of this checklist is to help ensure that all appropriate and necessary information is submitted to EPA. EPA recommends that States review this checklist carefully and provide all appropriate information to EPA. This checklist is for informational purposes only and does not need to be included as part of a waiver application.

	✓	Notes
Items		
General • Waiver request includes the following information: – Description of the foreign and domestic construction materials – Unit of measure – Quantity – Price – Time of delivery or availability – Location of the construction project – Name and address of the proposed supplier – A detailed justification for the use of foreign construction materials • Waiver request was submitted according to the instructions in the memorandum • Assistance recipient made a good faith effort to solicit bids for domestic iron and steel products, as demonstrated by language in requests for proposals, contracts, and communications with the prime contractor		
Cost Waiver Requests • Waiver request includes the following information: – Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products – Relevant excerpts from the bid documents used by the contractors to complete the comparison – Supporting documentation indicating that the contractor made a reasonable survey of the market, such as a description of the process for identifying suppliers and a list of contacted suppliers		
Availability Waiver Requests • Waiver request includes the following supporting documentation necessary to demonstrate the availability, quantity, and/or quality of the materials for which the waiver is requested: – Supplier information or pricing information from a reasonable number of domestic suppliers indicating availability/delivery date for construction materials – Documentation of the assistance recipient's efforts to find available domestic sources, such as a description of the process for identifying suppliers and a list of contacted suppliers. – Project schedule – Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of construction materials • Waiver request includes a statement from the prime contractor and/or supplier confirming the non-availability of the domestic construction materials for which the waiver is sought • Has the State received other waiver requests for the materials described in this waiver request, for comparable projects?		

Appendix 2: HQ Review Checklist for Waiver Request

Instructions: To be completed by EPA. Review all waiver requests using the questions in the checklist, and mark the appropriate box as Yes, No or N/A. Marks that fall inside the shaded boxes may be grounds for denying the waiver. If none of your review markings fall into a shaded box, the waiver is eligible for approval if it indicates that one or more of the following conditions applies to the domestic product for which the waiver is sought:

1. The iron and/or steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality.
2. The inclusion of iron and/or steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

Review Items	Yes	No	N/A	Comments
Cost Waiver Requests - Does the waiver request include the following information? - Comparison of overall cost of project with domestic iron and steel products to overall cost of project with foreign iron and steel products - Relevant excerpts from the bid documents used by the contractors to complete the comparison - A sufficient number of bid documents or pricing information from domestic sources to constitute a reasonable survey of the market - Does the Total Domestic Project exceed the Total Foreign Project Cost by more than 25%?				
Availability Waiver Requests - Does the waiver request include supporting documentation sufficient to show the availability, quantity, and/or quality of the iron and/or steel product for which the waiver is requested? - Supplier information or other documentation indicating availability/delivery date for materials - Project schedule - Relevant excerpts from project plans, specifications, and permits indicating the required quantity and quality of materials - Does supporting documentation provide sufficient evidence that the contractors made a reasonable effort to locate domestic suppliers of materials, such as a description of the process for identifying suppliers and a list of contacted suppliers? - Based on the materials delivery/availability date indicated in the supporting documentation, will the materials be unavailable when they are needed according to the project schedule? (By item, list schedule date and domestic delivery quote date or other relevant information) - Is EPA aware of any other evidence indicating the non-availability of the materials for which the waiver is requested? Examples include: - Multiple waiver requests for the materials described in this waiver request, for comparable projects in the same State - Multiple waiver requests for the materials described in this waiver request, for comparable projects in other States - Correspondence with construction trade associations indicating the non-availability of the materials - Are the available domestic materials indicated in the bid documents of inadequate quality compared those required by the project plans, specifications, and/or permits?				

Appendix 5: Sample Certifications

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

Date

Company Name

Company Address

City, State Zip

Subject: American Iron and Steel Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX
2. XXXX
3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

**American Iron & Steel (AIS) Requirement of the Consolidated Appropriations Act of 2014
(Public Law 113-76)**

Q&A Part 2

PRODUCT QUESTIONS

1. Q: Do all fasteners qualify for de minimis exemption?

A: No. There is no broad exemption for fasteners from the American Iron and Steel (AIS) requirements. Significant fasteners used in SRF projects are not subject to the de minimis waiver for projects and must comply with the AIS requirements. Significant fasteners include fasteners produced to industry standards (e.g., ASTM standards) and/or project specifications, special ordered or those of high value. When bulk purchase of unknown-origin fasteners that are of incidental use and small value are used on a project, they may fall under the national de minimis waiver for projects. The list of potential items could be varied, such as big-box/hardware-store-variety screws, nails, and staples. The key characteristics of the items that may qualify for the de minimis waiver would be items that are incidental to the project purpose (such as drywall screws) and not significant in value or purpose (such as common nails or brads).

EPA also clarifies that minor components of two listed products – valves and hydrants -- may not need to meet the AIS requirements if the minor components compromise a very small quantity of minor, low-cost fasteners that are of unknown origin.

2. Q: Does PCCP pipe have to be domestically produced?

A: Yes. Pre-stressed concrete cylinder pipe (PCCP) or other similar concrete cylinder pipes would be comparable to pre-cast concrete which is specifically listed in the Consolidated Appropriations Act of 2014 as a product subject to the AIS requirement.

3. Q: If the iron or steel is made from recycled metals will the vendor/supplier have to provide a certification document certifying that the recycled metals are domestically produced?

A: No. Recycled source materials used in the production of iron and steel products do not have to come from the U.S. Iron or steel scrap, for instance, are considered raw materials that may come from anywhere. While certification is not required for the raw material, EPA does recommend that additional final processing of iron and steel be certified to have occurred in the U.S.

4. Q: Do tanks used for filtration systems, if delivered to the construction site separately and then filled with filtration media onsite, have to be domestically produced?

A: No. Tanks that are specifically designed to be filters, or as parts of a filtration system, do not have to be domestically produced because these parts are no longer simply tanks, even if the filter media has not been installed and will be installed at the project site, as is customary to do for shipping purposes. These parts have only one purpose which is to be housing for filters and cannot be used in another fashion.

5. Q: Can a recipient use non-domestic flanged pipe?

A: No. While the Consolidated Appropriations Act of 2014 does not specifically mention flanged pipe, since it does mention both pipe and flanges, both products would need to be domestically produced. Therefore, flanged pipe would also need to be domestically produced.

6. Q: Can a recipient use non-domestic couplings, expansion joints, and other similar pipe connectors?

A: No. These products would be considered specialty fittings, due to their additional functionality, but still categorized under the larger “fitting” categorization. Fittings are defined as a material that joins pipes together or connects to a pipe (AWWA, The Drinking Water Dictionary, 2000). Therefore, these products must comply with the AIS requirements and be produced domestically.

7. Q: Can a recipient use non-domestic service saddles and tapping sleeves?

A: No. These products are necessary for pipe repair, to tap a water main, or to install a service or house connection. Therefore, they are included under the larger “pipe restraint” category which is a specifically identified product subject to the domestic preference in the Consolidated Appropriations Act of 2014.

8. Q: The AIS guidance does not appear to cover reused items (i.e., existing pipe fittings, used storage tanks, reusing existing valves). How should reused items be addressed?

A: The AIS guidance does not address reuse of items. Reuse of items that would otherwise be covered by AIS is acceptable provided that the item(s) was originally purchased prior to January 17, 2014, the reused item(s) is not substantially altered from original form/function, and any restoration work that may be required does not include the replacement or addition of foreign iron or steel replacement parts. EPA recommends keeping a log of these reused items by including them on the assistance recipient’s de minimis list, and stating therein that these items are reused products. The donation of new items (such as a manufacturer waiving cost for certain delivered items because of concerns regarding the origin of a new product) is not, however, considered reuse.

9. Q: What does “time needed” mean in the AIS guidance, in reference to the definition of “Reasonably Available Quantity”?

A: For considering whether a product would meet reasonably available quantity, “time needed” is based on the construction schedule. If the item is delayed and there is substantial impact on the overall construction schedule, this would not be according to the “time needed.”

10. Q: If a product is not specifically included on the list of AIS covered products, must it comply with AIS?

A: Possibly. The AIS requirements include a list of specifically covered products, one of which is construction materials, a broad category of potential products. For construction materials, EPA’s AIS guidance includes a set of example items that it considers construction materials composed primarily of iron and steel and covered by the Act. This example list in the guidance is not an all-inclusive list of potential construction materials. However, the guidance also includes a list of items that EPA specifically does not consider construction materials, generally those of electrical or complex-mechanical nature. If a product is similar to the ones in the non-construction material list (and it is also not specifically listed by the Act), it is not a construction material. For all other items specifically included in the Act, coverage is generally self-evident.

11. Q: If a listed iron and steel product is used as a part for an assembled product that is non-domestic, do the AIS requirements apply?

A: AIS requirements only apply to the final product as delivered to the work site and incorporated into the project. Other assemblies, such as a pumping assembly or a reverse osmosis package plant, are distinct products not listed and do not need to be made in the U.S. or composed of all U.S. parts. Therefore, for the case of a non-covered product used in a larger non-domestic assembly, the components, even if specifically listed in the Consolidated Appropriations Act, do not have to be domestically produced.

12. Q: Is cast iron excluded from the AIS requirements?

A: No. Cast iron products that fall under the definition of iron and steel products must comply with the AIS requirements.

13. Q: The guidance states that “construction materials” do not include mechanical equipment, but then identifies ductwork as a construction material. Please clarify.

A: Ductwork is not mechanical equipment, therefore it is considered a “construction material” and must comply with the AIS requirements.

14. Q: Do “meters” mentioned in EPA’s guidance as non-construction materials include both flow meters and water meters?

A: Yes. “Meters” includes any type of meter, including: flow meters, wholesale meters, and water meters/service connections.

15. Q: Must coiled steel be domestic?

A: Yes. Coiled steel is an intermediate product used in the production of steel pipe and must come from a U.S. source or subject to a waiver in order to comply with the AIS requirements.

16. Q: Are pig iron, direct reduced iron (DRI), and ingot considered raw materials?

A: No. These are considered intermediate products used in the production of iron or steel and must come from a U.S. source or subject to a waiver in order to comply with the AIS requirements.

17. Q: Can assistance recipients rely on a marking that reads, “Made in the USA,” as evidence that all processes took place in the U.S.?

A: No. This designation is not consistent with our requirements that all manufacturing processes of iron and steel products must take place in the U.S.

18. Q: When determining what constitutes a product made “primarily” of iron or steel, who makes this determination?

A: The manufacturer will show if its product qualifies as primarily made of iron or steel. The recipient should expect the manufacturer to provide documentation/ certification that its product is AIS compliant.

19. Q: Do aerators need to be produced domestically in order to comply with AIS?

A: No. Aerators, similar to pumps, are mechanical equipment that do not need to meet the AIS requirements. “Blowers/aeration equipment, compressors” are listed in EPA’s guidance as non-construction materials.

20. Q: Are Sluice and Slide Gates considered valves?

A: No. Valves are products that are generally encased / enclosed with a body, bonnet, and stem. Examples include enclosed butterfly, ball, globe, piston, check, wedge, and gate valves. Furthermore, “gates” (meaning sluice, slide or weir gates) are listed in EPA’s guidance as non-construction materials.

AIS PROCESS QUESTIONS

21. Q: Will notices of waiver applications be published in the federal register?

A: No. Applications for waivers will be published on EPA’s website (http://water.epa.gov/grants_funding/aisrequirement.cfm). EPA will provide 15 days for open public comment, as noted on the website.

22. Q: Will states be collecting the step certification paper trail, as presented in the AIS guidance?

A. No. Assistance recipients must maintain documentation of compliance with AIS. EPA recommends use of the step certification process. This process is a best practice and traces all manufacturing of iron and steel products to the U.S. If the process is used, the state does not have to collect the documentation. The documents must be kept by the assistance recipient and reviewed by the state during project reviews.

23. Q: Why is it considered a best practice for states to conduct site visits, when it is the assistance recipient's responsibility to meet the AIS requirements?

A: It is both the assistance recipient's and the state's responsibility to ensure compliance with the AIS requirements. The state is the recipient of a federal grant and must comply with all grant conditions, including a condition requiring that the AIS requirements be adhered to. Therefore, it is recommended that states conduct site visits of projects during construction and review documentation demonstrating the assistance recipient's proof of compliance.

24. Q: Please further define the state's role in the waiver process.

A: The state's role in the waiver process is to review any waiver requests submitted to the state in order to ensure that all necessary information has been provided by the assistance recipient prior to forwarding the request to EPA. If a state finds the request lacking, the state should work with the assistance recipient to help obtain complete information.

25. Q: How much time does EPA have to evaluate the waiver during the evaluation step?

A: At a minimum, EPA is required to provide 15 days for open public comment. There is no specific deadline or time limit for EPA to review waiver requests. Each waiver request will come with its own specific details and circumstances and may require a different amount of time for review and analysis. For example, public interest waivers in general may take longer to review than availability waivers which are typically more straightforward. However, EPA understands that construction may be delayed while waiting for a waiver and will make every effort to review and issue decisions on waiver requests in a timely manner.

PROJECT QUESTIONS

26. Q: What if a project is funded by another funding entity (i.e., United States Department of Agriculture – Rural Development) where AIS is not required and begins construction after January 17, 2014 but then applies to the SRF to refinance the project? Are they ineligible?

A: The project is not ineligible. AIS requirements will apply to any construction that occurs after the assistance agreement is signed, through the end of construction. If construction is complete, there is no retroactive application of the AIS requirements.

27. Q: If the assistance recipient can demonstrate through market research that the AIS requirement will exceed the 25 percent cost threshold, is the entire project exempt from the AIS requirement?

A: If the waiver application shows that the inclusion of American iron and steel products causes the entire cost of the project to increase by more the 25 percent, a waiver may be granted for the entirety of the project.

28. Q: Can the recipient use non-SRF funds to pay for the non-compliant item.

A: No. It is not an acceptable to use non-SRF funds to pay for a non-compliant item. The Consolidated Appropriations Act of 2014 requires that all iron and steel products, no matter the source of funding, must be made in the U.S. if SRF funds are used in the project.

29. Q: What constitutes “satisfactory quality” as defined in the AIS guidance, in reference to the availability waiver process.

A: “Satisfactory quality” means the product meets the project design specifications. A waiver may be granted if a recipient determines that the project plans and design would be compromised because there are no American made products available that meet the project design specifications.

30. Q: The guidance states that the AIS requirement applies to any project “funded in whole or in part” by an SRF. Where is this in the Act?

A: The Act states that, “None of the funds made available by a ... [State SRF program] ... shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.” This sentence clearly states that no SRF program may use its funds for a project unless all of the iron and steel products used in the project are made in the U.S. This is true even if only \$1 of SRF funding is used in the project.

31. Q: There is always an expectation on the part of an assistance recipient that the construction phase of a planning and/or design only loan will be funded through the SRF. If the original planning and/or design only loan was executed prior to a January 17, 2014, does this mean the entire project will be exempt from the AIS requirement?

A: If the original loan includes construction, and was executed prior to January 17, 2014, then the AIS provision does not apply to the project. If the original loan was only for planning and/or design, then a written commitment or documented “expectation” is needed to show exemption from the

requirements. Appearance on a priority list in an Intended Use Plan along with written reasonable assurance from the state that the recipient will receive SRF funding for project construction could provide sufficient evidence of “expectation of funding”.

- 32. Q: What if there has been a change order or redesign requiring new plans and specifications to be approved and they were approved after January 17, 2014: does the project now have to comply with AIS?**

A: In most cases, no. Change orders are typically small enough changes that the original plan and specification date will still hold true. For example, if a pipe alignment has to be changed for a block or two due to unforeseen conditions, but new plans and specifications had to be submitted for this section of the project, then that could be considered a minor change. However, if there has been a major redesign, perhaps the whole project had to be redesigned starting from scratch, then the new plans and specification approval date would apply.

- 33. Q: What if the bids on a project with plans and specifications approved before January 17, 2014 but the loan is signed after January 17, 2014 come in low, and there is significant funding remaining in the loan agreement, so the community designs a second project with the remaining funds: does that project have to comply with the AIS requirements?**

A: If the second project is closely related in purpose, place and time to the first project, then the second project would be exempt from the AIS requirements. It is the assistance recipient’s responsibility (with state oversight) to show that a project is closely related, or not, in purpose, place and time.

- 34. Q: What if the assistance agreement was signed after January 17, 2014, state approval of plans for the first phase of the project was in place prior to January 17, 2014, but state approval of the plans for the second phase of the project was received after January 17, 2014?**

A: In such a case, the AIS provision would not apply to the first phase of the project. If the second phase of the project is considered the same project as the first phase, due to its close relation in purpose, place and time, the entire project may be exempt. It is the assistance recipient’s responsibility (with state oversight) to show that phases of a project is closely related, or not, in purpose, place and time.

- 35. Q: Do products purchased through procurement-only contracts have to be comply with AIS?**

A: Yes. For projects funded by SRF, the products procured under any form of contract must comply with AIS. A procurement-only contract generally involves the bulk purchase of common items (such as pipe, concrete, and/or pumps) of independent timing from a set of planned projects. If products which are purchased through a procurement-only contract are being installed under another contract, the procurement-only contract would probably not be considered a separate project in purpose, place and time; and therefore, would have to comply with the AIS requirements.

March 2015

American Iron & Steel Requirement for the Clean Water and Drinking Water State Revolving Funds

Q&A Part 3

*For CWSRF and DWSRF: On **January 17, 2014**, Public Law 113-76, the "Consolidated Appropriations Act, 2014," was enacted and included an American Iron and Steel requirement for the Clean Water and Drinking Water State Revolving Fund programs through the end of fiscal year 2014. Since then, the AIS requirement has continued for both programs, but through different statutes, with a few changes as described in the questions and answers provided below.*

*For CWSRF: On **June 10, 2014**, the Water Resources Reform and Development Act amended the Clean Water Act to include permanent requirements for the use of AIS products in CWSRF assistance agreements. Section 608 of the CWA now contains requirements for AIS that repeat those of the Consolidated Appropriations Act, 2014. All CWSRF assistance agreements must comply with Section 608 of the CWA for implementation of the permanent AIS requirement.*

*For DWSRF: On **December 16, 2014**, the President signed Public Law 113-235, the "Consolidated and Further Continuing Appropriations Act, 2015," which provides fiscal year 2015 full-year appropriations through September 30, 2015. This law continues the requirement for the use of AIS products in DWSRF assistance agreements through September 30, 2015.*

CWSRF PROGRAM

- 1. Q: The Water Resources Reform and Development Act amended the Clean Water Act to include permanent requirements for the use of AIS for CWSRF funded assistance agreements. Does the CWA include an exemption for plans and specifications approved prior to the enactment of the legislation similar to the exemption included in the Consolidated Appropriations Act (CAA) 2014?**

A: Yes. The WRRDA amendment to the CWA, which included AIS requirements, included a similar exemption as the CAA 2014. For any CWSRF assistance agreement signed on or after October 1, 2014, if the plans and specifications were approved prior to June 10, 2014 (the enactment of WRRDA), then the project is exempt from AIS requirements. For assistance agreements signed prior to October 1, 2014, the previous dates in the CAA 2014 apply (see March 20, 2014, AIS guidance document).

If a project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the plans and specifications approval date for purposes of this exemption in Section 608 (f).

The following table summarizes AIS exemptions based on the plans and specifications approval date for CWSRF funded projects.

3/16/2015

CWSRF AIS Project Exemption Based on Plans and Specifications Approval Date		
<u>Assistance Agreement Signed:</u>	<u>Exempt from AIS if Plans and Specifications Were Approved Before:</u>	<u>Basis for Exemption:</u>
1/17/2014 through 9/30/2014	4/15/2014	- Consolidated Appropriations Act 2014 - National waiver signed 4/15/2014*
On or after 10/1/2014	6/10/2014	Clean Water Act Section 608

** To be covered by the national waiver, the plans and specifications had to be submitted to the state prior to 1/17/2014*

2. Q: Does the AIS requirement apply to refinanced CWSRF projects?

A: Yes, in some cases. If a project began construction, financed from a non-CWSRF source prior to June 10, 2014, but is refinanced through a CWSRF assistance agreement executed on or after October 1, 2014, AIS requirements will apply to all construction that occurs on or after June 10, 2014, through completion of construction, unless engineering plans and specifications were approved by the responsible state agency prior to June 10, 2014. For CWSRF projects funded on or after October 1, 2014, there is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to June 10, 2014.

DWSRF PROGRAM

3. Q: The Consolidated and Further Continuing Appropriations Act 2015 continues the AIS requirements for DWSRF funded assistance agreements. Does the Act include an exemption for plans and specifications approved prior to the enactment of the legislation, similar to the exemption included in the Consolidated Appropriations Act (CAA) 2014?

A: Yes. The Consolidated and Further Continuing Appropriations Act 2015 includes a similar exemption as the CAA 2014. For any assistance agreement signed on or after December 16, 2014 (the enactment of the Act), if the plans and specifications were approved prior to December 16, 2014, then the project is exempt from the AIS requirements. For assistance agreements signed prior to December 16, 2014, the previous dates in the CAA 2014 apply (see March 20, 2014 AIS guidance document).

If a project does not require approved engineering plans and specifications, the bid advertisement date will count in lieu of the plans and specifications approval date for purposes of the exemption in Section 424(f).

3/16/2015

4. Q: Do DWSRF assistance agreements signed during the time period between September 30, 2014, and December 16, 2014, still have to comply with the AIS requirements?

A: Yes. The Continuing Appropriations Resolution 2015 was signed on September 19, 2014, which extended funding for the DWSRF with the same conditions that were made applicable by the language in the Fiscal Year 2014 appropriations, including the requirement for the use of American Iron and Steel products in projects receiving financial assistance from the DWSRF. Therefore, all assistance agreements starting October 1, 2014, through the enactment of the Consolidated and Further Continuing Appropriations Act 2015 (signed December 16, 2014), must include the AIS requirements. However, if the plans and specifications for any of these projects were approved prior to April 15, 2014 (the date the national waiver was signed), then the project is exempt from the AIS requirements.

The following table summarizes AIS exemptions based on the plans and specifications approval date for DWSRF funded projects.

DWSRF AIS Project Exemption Based on Plans and Specifications Approval Date		
<u>Assistance Agreement Signed:</u>	<u>Exempt from AIS if Plans and Specifications Were Approved Before:</u>	<u>Basis for Exemption:</u>
1/17/2014 through 9/30/2014	4/15/2014	- Consolidated Appropriations Act 2014 - National waiver signed 4/15/2014*
10/1/2014 through 12/15/2014	4/15/2014	- Continuing Appropriations Resolution 2015 (continued CAA 2014 requirements)** - National waiver signed 4/15/2014*
12/16/2014 through 9/30/2015	12/16/2014	Consolidated and Further Continuing Appropriations Act 2015

* To be covered by the national waiver, the plans and specifications had to be submitted to the state prior to 1/17/2014

** Following the first continuing resolution, there were two additional CRs to fill the gap between 12/11/2014 and 12/16/2014

5. Q: Does the AIS requirement apply to refinanced DWSRF projects?

A: Yes, in some cases. If a project began construction, financed from a non-DWSRF source prior to December 16, 2014, but is refinanced through a DWSRF assistance agreement executed on or after December 16, 2014, AIS requirements will apply to all construction that occurs on or after December 16, 2014, through completion of construction, unless engineering plans and

3/16/2015

specifications were approved by the responsible state agency prior to December 16, 2014. For DWSRF projects funded on or after December 16, 2014, there is no retroactive application of the AIS requirements where a refinancing occurs for a project that has completed construction prior to December 16, 2014.

BOTH CWSRF AND DWSRF PROGRAMS

6. **Q: If a coating is applied to the external surface of a domestic iron or steel component, and the application takes place outside of the United States, would the product be compliant under the AIS requirements?**

A: Yes. The product would still be considered a compliant product under AIS requirements. Any coating processes that are applied to the external surface of iron and steel components that would otherwise be AIS compliant would not disqualify the product from meeting the AIS requirements regardless of where the coating processes occur, provided that final assembly of the product occurs in the United States.

The exemption above only applies to coatings on the *external surface* of iron and steel components. It does not apply to coatings or linings on internal surfaces of iron and steel products, such as the lining of lined pipes. All manufacturing processes for lined pipes, including the application of pipe lining, must occur in the United States for the product to be compliant with AIS requirements.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WAIRM

DECISION MEMORANDUM

SUBJECT: De Minimis Waiver of Section 436 of P.L. 113-76, Consolidated Appropriations Act (CAA), 2014

FROM: Nancy K. Stoner
Acting Assistant Administrator

The EPA is hereby granting a nationwide waiver pursuant to the "American Iron and Steel (AIS)" requirements of P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), section 436 under the authority of Section 436(b)(1) (public interest waiver) for de minimis incidental components of eligible water infrastructure projects. This action permits the use of products when they occur in de minimis incidental components of such projects funded by the Act that may otherwise be prohibited under section 436(a). Funds used for such de minimis incidental components cumulatively may comprise no more than a total of 5 percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed 1 percent of the total cost of the materials used in and incorporated into a project.

P.L. 113-76, Consolidated Appropriations Act, 2014 (Act), includes an "American Iron and Steel" (AIS) requirement in section 436 that requires Clean Water State Revolving Loan Fund (CWSRF) and Drinking Water State Revolving Loan Fund (DWSRF) assistance recipients to use specific domestic iron and steel products that are produced in the United States if the project is funded through an assistance agreement executed beginning January 17, 2014 (enactment of the Act), through the end of Fiscal Year 2014, unless the agency determines it necessary to waive this requirement based on findings set forth in Section 436(b). The Act states, "[the requirements] shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency...finds that- (1) applying subsection (a) would be inconsistent with the public interest" 436(b)(1).

In implementing section 436 of the Act, the EPA must ensure that the section's requirements are applied consistent with congressional intent in adopting this section and in the broader context of the purposes, objectives, and other provisions applicable to projects funded under the SRF. Water infrastructure projects typically contain a relatively small number of high-cost components incorporated into the project. In bid solicitations for a project, these high-cost components are generally described in detail via project specific technical specifications. For these major components, utility owners and their contractors are generally familiar with the conditions of availability, the potential alternatives for each detailed specification, the approximate cost, and the country of manufacture of the available components.

Every water infrastructure project also involves the use of thousands of miscellaneous, generally low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. For many of these incidental components, the country of manufacture and the availability of alternatives is not always readily or reasonably identifiable prior to procurement in the normal course of business; for other incidental components, the country of manufacture may be known but the miscellaneous character in conjunction with the low cost, individually and (in total) as typically procured in bulk, mark them as properly incidental. Examples of incidental components could include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. Examples of items that are clearly not incidental include significant process fittings (i.e., tees, elbows, flanges, and brackets), distribution system fittings and valves, force main valves, pipes for sewer collection and/or water distribution, treatment and storage tanks, large structural support structures, etc.

The EPA undertook multiple inquiries to identify the approximate scope of de minimis incidental components within water infrastructure projects during the implementation of the American Reinvestment and Recovery Act (ARRA) and its requirements (Buy American provisions, specifically). The inquiries and research conducted in 2009 applies suitably for the case today. In 2009, the EPA consulted informally with many major associations representing equipment manufacturers and suppliers, construction contractors, consulting engineers, and water and wastewater utilities, and performed targeted interviews with several well-established water infrastructure contractors and firms who work in a variety of project sizes, and regional and demographic settings to ask the following questions:

- What percentage of total project costs were consumables or incidental costs?
- What percentage of materials costs were consumables or incidental costs?
- Did these percentages vary by type of project (drinking water vs. wastewater treatment plant vs. pipe)?

The responses were consistent across the variety of settings and project types, and indicated that the percentage of total costs for drinking water or wastewater infrastructure projects represented by these incidental components is generally not in excess of 5 percent of the total cost of the materials used in and incorporated into a project. In drafting this waiver, the EPA has considered the de minimis proportion of project costs generally represented by each individual type of these incidental components within the many types of such components comprising those percentages, the fact that these types of incidental components are obtained by contractors in many different ways from many different sources, and the disproportionate cost and delay that would be imposed on projects if the EPA did not issue this waiver.

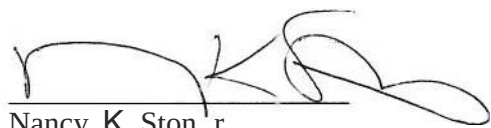
Assistance recipients who wish to use this waiver should in consultation with their contractors determine the items to be covered by this waiver and must retain relevant documentation (i.e., invoices) as to those items in their project files.

If you have any questions concerning the contents of this memorandum, please contact Timothy Connor, Chemical Engineer, Municipal Support Division, at connor.timothy@epa.gov or (202) 566-1059 or Kirsten Anderer, Environmental Engineer, Drinking Water Protection Division, at anderer.kirsten@epa.gov or (202) 564-3134.

A?R t5 2014

Issued on: _____

Approved by: _____


Nancy K. Stoner
Acting Assistant Administrator

Ohio Water Pollution Control Loan Fund
Use of American Iron and Steel - De Minimis Final Utilization and Certification Form

The Consolidated Appropriations Act of 2014 (P.L. 113-76) Section 436 requires the use of American & Steel in SRF-funded projects. Under the authority of Section 436(b)(1), the EPA has issued a public interest waiver for De Minimis incidental components. The assistance recipient wishing to use this waiver should consult with their contractor(s) to maintain an itemized list of components covered under De Minimis. At the conclusion of the project, this form must be completed and retained in the assistance recipient's project files and a copy provided to DEFA. Please print clearly or type.

Project Name: _____ Loan Agrmt #: _____

NOTE: The De Minimis waiver is only applicable to the cost of materials for the entire project. Do not include other project costs (labor, installation costs, etc.) in the "Total Cost of Materials". The cost of a material must include delivery to the site and any applicable tax. Must have sufficient documentation to support all costs included in this calculation.

Funds used for de minimis incidental components cumulatively may comprise no more than a total of 5 percent of the total cost of the materials used in and incorporated into a project; the cost of an individual item may not exceed 1 percent of the total cost of the materials used in and incorporated into a project.

Total Cost of Materials: 5% Limit: 1% limit:

Manufacturer & Component Description	Part/Model #	Quantity (if applicable)	Cost per Unit (if applicable)	Component's Total Cost	How is Cost Documented?*

Use additional sheets as necessary

Total De Minimis Cost of Components:

If approaching the 5% or 1% limits, contact DEFA immediately

* Documentation must demonstrate confirmation of the components' actual costs (invoice, etc.).

Completed by:

Name: _____

Title: _____

Signature: _____

Date: _____

Prohibition on Telecommunications and Video Surveillance

§ 200.216 Prohibition on certain telecommunications and video surveillance services or equipment.

- (a) Recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:
 - (1) Procure or obtain;
 - (2) Extend or renew a contract to procure or obtain; or
 - (3) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in [Public Law 115–232](#), section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
 - (i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
 - (ii) Telecommunications or video surveillance services provided by such entities or using such equipment.
 - (iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.
- (b) In implementing the prohibition under [Public Law 115–232](#), section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.
- (c) See [Public Law 115–232](#), section 889 for additional information.
- (d) See also [§ 200.471](#).

Resources:

[2 CRF 200.216](#)

FAQ's: [Sec. 889 of 2019 NDAA FAQ 20201124.pdf \(performance.gov\)](#)

[Public Law 115-232, Section 889](#)

[§ 200.471](#)

SECTION 9
PREVAILING WAGE RATES

Davis-Bacon Wage Rate Requirements

(required contract provision)

Background and Applicability

On October 30, 2009, P.L. 111-88, "Making appropriations for the Department of the Interior, environment, and related agencies for the fiscal year ending September 30, 2010, and for other purposes," was enacted. This law provides appropriations for both the Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF) for Fiscal Year 2010, while adding new requirements to these already existing programs. One new requirement requires the application of Davis-Bacon Act requirements.

Application of the Davis-Bacon Act requirements extend not only to assistance agreements funded with Fiscal Year 2010 appropriations, but to all assistance agreements executed on or after October 30, 2009, whether the source of the funding is prior year's appropriations, state match, bond proceeds, interest earnings, principal repayments, or any other source of funding so long as the project is financed by an SRF assistance agreement. If a project began construction prior to October 30, 2009 but is financed or refinanced through an assistance agreement executed on or after October 30, 2009, Davis-Bacon Act requirements will apply to all construction that occurs on or after October 30, 2009, through completion of construction.

Ohio EPA Responsibilities

With respect to the Water Pollution Control Loan Fund (WPCLF) and Water Supply Revolving Loan Account (WSRLA) revolving funds, EPA provides capitalization grants to each State which in turn provides funding assistance to eligible recipients within the State. Typically, the assistance recipients are municipal or other local governmental entities that manage the funds. Occasionally, the assistance recipients may be a private for profit or not for profit entity. Although EPA and the State are responsible for ensuring assistance recipients incorporate the wage rate requirements set forth herein as part of contracts for WPCLF and WSRLA funding, the assistance recipient has the primary responsibility to maintain payroll records and for compliance with Davis-Bacon Act requirements as described below.

Municipal Or Other Local Governmental Entities Recipient's Responsibilities

The following is intended to help assistance recipients understand and meet their obligations related to Davis-Bacon (DB). Each assistance recipients should, however, review the contract/subcontract requirements that are set forth later in this document for a more full understanding of DB obligations.

Prior to advertising for bids:

- > Obtain the wage determination for the locality in which a covered activity subject to DB will take place from the Department of Labor (DOL) at www.wdol.gov.
- > Incorporate these wage determinations into the request for bids.
- > Include the required contract provisions (see below) into the contract documents.
- > Require prime contracts to include provisions that subcontractors follow the wage determination incorporated into the prime contract.

During the advertisement period:

- > Monitor www.wdol.gov on a weekly basis to ensure that the wage determination contained in the request for bids remains current.
- > If DOL modifies the DB wage determination more than 10 days prior to the bid opening, issue an addendum reflecting the modification.
- > If DOL modifies or supersedes the DB wage determination less than 10 days prior to bid opening and you cannot issue an addendum for the change, you must request a finding from Ohio EPA that there is not reasonable time to notify interested contractors of the modification of the wage determination. The Ohio EPA will give you a report of its findings.

After opening bids:

- > If the contract(s) aren't awarded within 90 days of the bid opening you must monitor www.wdol.gov on a weekly basis to ensure that wage determinations used in the bids remain current.
- > If the contract(s) aren't awarded within 90 days of the bid opening, any modifications or supersedes that DOL makes to the wage determination must be incorporated into the contract unless (1) you request an extension from Ohio EPA AND (2) Ohio EPA obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv).

After contracts are signed and during construction:

- > Review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.
- > DOL may issue a revised wage determination applicable to one or all of your contracts after the award of the contract or execution of the change order which incorporated DB requirements into the contract if DOL determines that you have failed to incorporate a wage determination or have used a wage determination that clearly does not apply to the contract. If this occurs, you shall either terminate the contract or change order and rebid the contract OR incorporate DOL's wage determination retroactive to the beginning of the contract by change order. The contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.
- > Periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. You must use Standard Form 1445 or equivalent documentation to memorialize the interviews.
- > Establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, you must:
 - conduct all interviews in confidence.
 - conduct interviews with a representative group of covered employees within two weeks of each contractor or subcontractor's submission of its initial weekly payroll data and two weeks prior to the estimated completion date for the contract or subcontract.
 - conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB.
 - immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements.
- > Periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. You must:
 - establish and follow a spot check schedule based on your assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract.
 - spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract at a minimum.
 - conduct more frequent spot checks if the initial spot check or other information indicates that there

is a risk that the contractor or subcontractor is not complying with DB.

- during the examinations, verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

> Periodically review contractors' and subcontractors' use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the DOL or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews.

> Immediately report potential violations of the DB prevailing wage requirements to Andrew Lausted at EPA Region V at 312-886-0189 and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/esa/contacts/whd/america2.htm>.

If contracts have already been signed and DB requirements need to be incorporated:

> If contracts have already been signed prior to WPCLF/WSRLA funding being provided, you must issue a change order, task order, work assignment or similar legally binding instrument and incorporate the appropriate DOL wage determination from www.wdol.gov as well as the required contract provisions into the contract(s).

> Initiate the contractor and subcontractor review and wage interview requirements as described above and provided in the **Contract And Subcontract Provisions**.

**Private For Profit Or Not For Profit (Non-Governmental) Entities
Recipient's Responsibilities**

The requirements, responsibilities and contract provisions for Private For Profit or Not For Profit Entities (Non-Governmental Entities) is exactly the same as for Municipal Or Other Local Governmental Entities EXCEPT for the following:

Prior to advertising for bids:

> Obtain the proposed wage determinations for specific localities from www.wdol.gov.

> Submit the wage determination to Ohio EPA for approval prior to inserting the wage determination into the solicitation unless subsequently directed otherwise by Ohio EPA.

Contract And Subcontract Provisions For Contracts In Excess Of \$2,000

The following language must be included in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public work, or building or work financed in whole or in part with WPCLF or WSRLA funds and which is subject to the labor standards provisions of any of the acts listed in §5.1:

NOTE: Modify the first sentence to include the name of the WPCLF/WSRLA funding recipient prior to including these provisions in the contract documents.

Wage Rate Requirements

As used in these provisions "subrecipient" means _____ (fill in WPCLF/WSRLA funding recipient name here).

(a) The following applies to any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a public building or public

work, or building or work financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1.

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, www.wdol.gov.

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The EPA award official shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the subrecipient(s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department

of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the questions, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account asset for the meeting of obligations under the plan or program.

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the

plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the subgrant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5(a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees --

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe

benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

Contract Provision For Contracts In Excess Of \$100,000 And Subject To The Overtime Provisions Of The Contract Work Hours And Safety Standards Act

The following language must be included in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These provisions are to be included in addition to the provisions for contracts in excess of \$2,000. As used in these paragraphs, the terms laborers and mechanics include watchmen and guards.

(b) Contract Work Hours and Safety Standards Act. The following applies to any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. As used in these paragraphs, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

Contract Provision For Contracts In Excess Of \$100,000 Subject ONLY To The Contract Work Hours And Safety Standards Act

In addition to the provisions for contracts in excess of \$2,000, for any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, you must insert clauses requiring:

(c) The following applies to any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1.

The contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid.

The records shall be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Ohio EPA, EPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

Date _____

I, _____ (Name of Signatory Party) _____ (Title)
do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor or Subcontractor)
_____;
(Building or Work) _____; that during the payroll period commencing on the _____

_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have
been or will be made either directly or indirectly to or on behalf of said

_____ from the full _____
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly
from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part
3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948,
63 Stat. 108, 72 Stat. 967; 40 U.S.C. § 3145), and described below:

DB. 12

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
applicable wage rates contained in any wage determination incorporated into the contract; that the classifications
set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship
program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and
Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered
with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ — in addition to the basic hourly wage rates paid to each laborer or mechanic listed in
the above referenced payroll, payments of fringe benefits as listed in the contract
have been or will be made to appropriate programs for the benefit of such employees,
except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ — Each laborer or mechanic listed in the above referenced payroll has been paid,
as indicated on the payroll, an amount not less than the sum of the applicable
basic hourly wage rate plus the amount of the required fringe benefits as listed
in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE
THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.	

How to Correctly Fill Out a WH-347 Payroll Form

The completion of the WH-347 Payroll Form is optional; contractors may utilize their own payroll system as long as it conforms to the WH-347 Payroll Form and contains all the necessary information. If you utilize WH-347 Payroll Form as a pdf, saving it electronically aids in making any needed corrections.

U.S. Department of Labor
Employment Standards Administration
Wage and Hour Division

PAYROLL
(For Contractor's Optional Use; See Instructions at www.dol.gov/esa/whd/forms/wh347instr.htm)
Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐ Sample Construction Company

ADDRESS 385 West Drive, Madison WI 53703

OMB No.: 1215-0149
Expires: 12/31/2011

PAYROLL NO. 8

PROJECT AND LOCATION Robin Street Apartments, Delafield WI 53018

PROJECT OR CONTRACT NO. 3000

FOR WEEK ENDING 04/24/2010

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) EMPLOYMENT STATUS (1) FULL-TIME (2) SEASONAL (3) TEMPORARY (4) OTHER	(3) WORK CLASSIFICATION (e.g., Power Equipment Operator)	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS				(9) NET WAGES PAID FOR WEEK				
			Sun	Mon	Tue	Wed	Thurs	Frid	Sat				WITH- HOLDING TAX	State with- holding tax	Medicare	OTHER		TOTAL DEDUCTIONS			
Alex Driver - ####	2	Bull Dozer Operator									2.00	\$62.83	\$1,422.84	\$161.00	\$185.15	\$156.97	\$50.31	\$85.00	\$2,012.46	\$936.43	\$1,374.03

Check one of the boxes and list name of contractor or subcontractor

The last day of the payroll period.

Fill out completely with contractor or subcontractor address

The prime contractor should include the project number as listed in the loan

The name and location of project.

Indicate the days and dates of the pay period. (should match week ending directly above)

Payrolls must be numbered sequentially and should be based on the weeks worked under a contract.

Type the word "Final" when the last payroll is submitted for the project.

List each worker's name.

Only laborers and mechanics performing construction work under the contract should be listed.

Please note: Business Owners need only include their name, work classification including "owner" and the daily total hours worked.

Specify the job classification located in the contract wage decision and/or the corresponding job title.

List hourly wage rate and fringes paid in cash (not those paid to plans)

(For Contractor's Optional Use) See instructions at www.dol.gov/esa/whd/forms/wh347instr.htm

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.



Specify the net amount paid to the employee for the pay

Specify the total overtime and straight time hours worked on the project.

Must accurately reflect overtime and straight time hours worked under the contract.

Specify the gross earnings for the hours worked under the contract.

Firm Name Jan Company		ADDRESS 385 West Drive, Madison WI 53703		PROJECT OR CONTRACT NUMBER 3000					
FOR WEEK ENDING 04/24/2010		PROJECT AND LOCATION Robin Street Apartment, Delafield WI 53018							
(3) WORK CLASSIFICATION		(4) DAY AND DATE		(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS	(9) NET AMOUNT PAID TO EMPLOYEE	
NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER OF WORKER)		Sun Mon Tue Wed Thu Fri Sat		HOURS WORKED EACH DAY		FICA		TOTAL DEDUCTIONS	
Alex Driver - ####		18 19 20 21 22 23 24		2.00		\$62.83		\$1,422.84	
Power Equipment Operator Bull Dozer Group 2		S		S		S		S	
Jason Worker - ####		S		S		S		S	
General Laborer		S		S		S		S	
Shawn Worker - ####		S		S		S		S	
Carpenter		S		S		S		S	
Apprentice Carpenter 1st 6 mo. at 40%		S		S		S		S	
Plumber		S		S		S		S	
Roy Wrench - ####		S		S		S		S	
Steamfitter		S		S		S		S	
Bart Turner - ####		S		S		S		S	
Power Equipment Rotary Drill Group 4		S		S		S		S	
		S		S		S		S	
		S		S		S		S	

While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to furnish weekly a statement with respect to the wages paid each worker on the project. Contractors and subcontractors submitting a copy of a payroll to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information for compliance.

Public Burden Statement

If part of a worker's weekly wage was earned on projects other than the project described on this payroll, enter the gross amount earned on this contract in the top half of column 7. Enter the gross amount earned during the week for all projects in the bottom half.

Alex Driver worked 29.5 hours on this contract and 12.5 hours on another contract.
The gross wages earned on this project, \$1,422.84, is entered in the top half of column 7.
The gross wages earned on all projects, \$2,012.46, is entered in the

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	(4) DAY AND DATE							DEDUCTIONS							(9) NET WAGES PAID FOR WEEK		
			Sun 18	Mon 19	Tue 20	Wed 21	Thurs 22	Fri 23	Sat 24	TOTAL HOURS	RATE OF PAY	GROSS AMOUNT EARNED	FICA	WITH- HOLDING TAX	State with- holding tax	Medicare		OTHER	TOTAL DEDUCTIONS
Alex Driver - #####	2	Power Equipment Bull Dozer Group 2							2.00	\$62.83	\$1,422.84	\$185.15	\$156.97	\$50.31	\$85.00	\$638.43	\$1,374.03		
Jason Worker - #####	2	General Laborer							4.00	\$40.70	\$1,700.78	\$135.06	\$132.66	\$42.52		\$467.71	\$1,233.07		
Sharon Wood - #####	3	Carpenter							1.50	\$60.19	\$1,887.49	\$151.00	\$128.35	\$47.19		\$481.31	\$1,406.18		
Reggie Tree - #####	1	Apprentice Carpenter 1st 6 mo. at 40%							40.00	\$32.72	\$1,887.49	\$85.18	\$90.50	\$26.62		\$307.71	\$757.01		
Roy Wrench - #####	5	Plumber									\$1,064.72								
Roy Wrench - #####	5	Steamfitter							20.00	\$69.13	\$1,038.40	\$163.46	\$147.11	\$51.08		\$480.16	\$1,563.04		
Bart Turner - #####	1	Power Equipment Rotary Drill Group 4							24.00	\$60.80	\$719.28	\$112.41	\$142.48	\$35.98		\$415.53	\$1,023.27		

If an employee performs multiple work

If an employee performs multiple work classifications under the contract, use two or more lines to distinguish the different job classifications, hours worked, and hourly wage earned for each.

Combine the two classifications when recording the gross amount earned for this pay period, deductions, and net wages.

A registered apprentice performing work under a contract must be reported. The payroll must include the current pay scale & provide a copy of the apprenticeship agreement.

Provide explanation of "other" deductions on signatory page.



PAYROLL

Optional Use; See Instructions at www.dol.gov/esa/whd/forms/wh347
 used to respond to the collection of information unless it displays a currently valid OMB control number.

Division 108
 Date: 5-0149
 Date: 5/1/2011

ADDRESS 385 West Drive, Madison WI 53703

PROJECT OR CONTRACT NO. 3000

PROJECT AND LOCATION
 Robin Street Apartments, Delafield WI 53018

4/1/24/2010

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO OF EMPLOYERS	(3) WORK CLASSIFICATION	(4) DAY AND DATE														(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS					(9) NET WAGES PAID FOR WEEK	
			HOURS WORKED EACH DAY							FICA	WITH- HOLDING TAX	State with- holding tax	Medicare	OTHER	TOTAL DEDUCTIONS											
			Sun	Mon	Tue	Wed	Thur	Frid	Sat																	
			18	19	20	21	22	23	24																	
Alex Driver - ####	2	Power Equipment Bull Dozer Group 2									2.00						\$62.83	\$1,422.84	\$161.00	\$185.15	\$156.97	\$50.31	\$85.00	\$638.43	\$1,374.03	
Jason Worker - ####	4	General Laborer										4.00						\$49.20	\$2,012.46	\$136.06	\$156.47	\$132.66	\$42.52		\$467.71	\$1,233.07
Sharon Wood- ####	3	Carpenter									1.50							\$60.19	\$1,387.49	\$151.00	\$154.77	\$128.35	\$47.19		\$481.31	\$1,406.18
Reggie Tree - ####	1	Apprentice Carpenter 1st 6 mo. at 40%																\$32.72	\$1,064.72	\$85.18	\$105.41	\$90.50	\$26.62		\$307.71	\$757.01
Roy Wrench - ####	5	Plumber																\$67.88	\$1,004.80							
Roy Wrench - ####	5	Steamfitter																\$69.13	\$1,038.40	\$163.46	\$147.11	\$118.51	\$51.08		\$480.16	\$1,563.04
Bart Turner - ####	1	Power Equipment Rotary Drill Group 4																\$60.80	\$719.28	\$115.14	\$142.48	\$122.33	\$35.98		\$415.93	\$1,023.27
																		\$29.97	\$1,439.20							

Fringe benefits are not paid as cash to

While completion of Form WH-347 is required by the Department of Labor, 29 C.F.R. § 3145, contractors are not required to file this form with the Department of Labor, 29 C.F.R. § 5.5(a)(3)(i) if the contractor has been paid or mechanic has been paid.

We estimate that is will take approximately 15 minutes to complete this form, including gathering data sources, gathering and reviewing the collection of information. If you have any comments regarding this collection of information, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, ESA, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W., Washington, D.C. 20210

(over)

Fringe benefits are not paid as cash to Bart Turner: explanation is included under "(c) exceptions" on signatory page.

Date 04/28/2010
I, Tiffany Payer Payroll Supervisor
(Name of Signatory Party) (Title)
do hereby state:

(1) That I pay or supervise the payment of the persons employed by
Sample Construction Company
(Contractor or Subcontractor) on the
Robin Street Apartments, Delafield WA; that during the payroll period commencing on the
18 day of 4, 2010 and ending the 24 day of 4, 2010
all persons employed on said project have been paid the full weekly wages earned, that no rebates have
been or will be made either directly or indirectly to or on behalf of said
Sample Construction Company
(Contractor or Subcontractor) from the full
weekly wages earned by any person and that no deductions have been made either directly or indirectly
from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part
3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 940,
63 Stat. 108, 72 Stat. 907, 76 Stat. 357; 40 U.S.C. § 3145), and described below:

Alex Driver - #### - other deductions - \$85 for child support

Explanation of "other"

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:
(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ - In addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☒ - Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION
Power Equipment Rotary Drill Group 4	paid directly to plan: health & dental at \$12.50 per hour and Pension at \$6.25 per hour

Explanation of exception to fringe benefits

REMARKS:

NAME AND TITLE Robert Sample, Owner	SIGNATURE
THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.	

CONTRACTOR FRINGE BENEFIT STATEMENT

Contract # /Project Name:	Contract Location:	Today's Date:
Contractor / Subcontractor Name:		Business Address:

In order that the proper Fringe Benefit rates can be verified when checking payrolls on the above contract, the hourly rates for fringe benefits, subsistence and/or travel allowance payment made for employees by the employer on the various classes of work are tabulated below. Please Include Apprentice Rates.

Classification:		Effective Date:	Subsistence or Travel Pay: \$
EMPLOYER PAID FRINGE BENEFITS	Health & Welfare \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Pension \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Vacation/Holiday \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Training \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Other \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	

Classification:		Effective Date:	Subsistence or Travel Pay: \$
EMPLOYER PAID FRINGE BENEFITS	Health & Welfare \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Pension \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Vacation/Holiday \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Training \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	
	Other \$ _____ hr	Paid To: Name of Plan/Fund/Program: Address:	

Supplemental statements must be submitted during the progress of the work should there be an increase or change in rates. Use additional sheets as necessary. (Attach a copy of your most recent premium transmittal (including copy of check submitted) into each of the above plans/funds/programs or a letter from the above plans/funds/programs reflecting current payment status).

I certify under penalty of perjury that fringe benefits are paid to the approved plans, funds or programs as listed above.

Name and Title	Signature and Date (Wet Signature Required)

PREVAILING WAGE NOTIFICATION TO EMPLOYEE

Project Name:		Job Number:	
Contractor:			
Project Location:			
Jobsite posting of prevailing wage rates located:			
Prevailing Wage Coordinator		Employee	
Name:		Name:	
Street:		Street:	
City:		City:	
State / Zip:		State / Zip:	
Phone:		Phone:	
You will be performing work on this project that falls under these classifications. You will be paid the appropriate rate for the type of work you are performing.			
Classification	Prevailing Wage Rate Total Package	Minus Your Fringe Benefits	Your Hourly Base Rate
Hourly fringe benefits paid on your behalf by this company.			
Fringe	Amount	Fringe	Amount
Health Insurance		Vacation	
Life Insurance		Holiday	
Pension		Sick Pay	
Bonus		Training	
Other		TOTAL HOURLY FRINGES	
Contractor's Signature:		Date:	
Employee's Signature:		Date:	

whpw1512

Wage Determinations are issued for four types of construction categories:

Heavy Construction includes projects that cannot be classified as Building, Residential, or Highway. Heavy construction is often further distinguished on the basis of the characteristic of particular projects, such as dredging, water and sewer lines, dams, major bridges, and flood control projects.

Highway Construction includes the construction, alteration, or repair of roads, streets, highways, runways, parking areas and most other paving work not incidental to building, residential, or heavy construction.

Heavy and Highway are grouped together as one State Wide Determination in Ohio.

Building Construction includes the construction, alteration, or repair of sheltered enclosures with walk-in access for the purpose of housing persons, machinery, equipment, or supplies and the associated installation of utilities and equipment, as well as incidental grading and paving.

Residential Construction includes the construction, alteration, or repair of single family houses, townhouses, and apartment buildings of no more than four stories in height and all incidental work, such as site work, parking areas, utilities, streets, and sidewalks.

***This project includes Building work therefore
both Building rates and Heavy/Highway rates
will apply to this project.***

"General Decision Number: OH20250001 09/26/2025

Superseded General Decision Number: OH20240001

State: Ohio

Construction Types: Heavy and Highway

Counties: Ohio Statewide.

Heavy and Highway Construction Projects

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/03/2025
1	02/07/2025
2	02/14/2025
3	02/28/2025
4	03/07/2025
5	03/14/2025
6	04/25/2025
7	05/02/2025
8	05/09/2025
9	05/16/2025
10	05/30/2025
11	06/06/2025
12	06/27/2025
13	07/11/2025
14	07/18/2025

15	07/25/2025
16	08/08/2025
17	08/15/2025
18	09/05/2025
19	09/12/2025
20	09/26/2025

BROH0001-001 06/01/2024

DEFIANCE, FULTON (Excluding Fulton, Amboy & Swan Creek Townships), HENRY (Excluding Monroe, Bartlow, Liberty, Washington, Richfield, Marion, Damascus & Townships & that part of Harrison Township outside corporate limits of city of Napoleon), PAULDING, PUTNAM and WILLIAMS COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0001-004 06/01/2023

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 32.40	19.30

BROH0003-002 06/01/2024

FULTON (Townships of Amboy, Swan Creek & Fulton), HENRY (Townships of Washington, Damascus, Richfield, Bartlow, Liberty, Harrison, Monroe, & Marion), LUCAS and WOOD (Townships of Perrysburg, Ross, Lake, Troy, Freedom, Montgomery, Webster, Center, Portage, Middleton, Plain, Liberty, Henry, Washington, Weston, Milton, Jackson & Grand Rapids) COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0005-003 06/01/2020

CUYAHOGA, LORAIN & MEDINA (Hinckley, Granger, Brunswick, Liverpool, Montville, York, Homer, Harrisville, Chatham, Litchfield & Spencer Townships and the city of Medina)

	Rates	Fringes
BRICKLAYER		
BRICKLAYERS; CAULKERS;		
CLEANERS; POINTERS; &		
STONEMASONS.....	\$ 36.64	17.13
SANDBLASTERS.....	\$ 36.39	17.13
SEWER BRICKLAYERS & STACK		
BUILDERS.....	\$ 36.64	17.13
SWING SCAFFOLDS.....	\$ 37.14	17.13

BROH0006-005 06/01/2024

CARROLL, COLUMBIANA (Knox, Butler, West & Hanover Townships), STARK & TUSCARAWAS

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0007-002 06/01/2024

LAWRENCE

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0007-005 06/01/2023

PORTAGE & SUMMIT

	Rates	Fringes
BRICKLAYER.....	\$ 32.40	19.30

BROH0007-010 06/01/2024		

PORTAGE & SUMMIT

	Rates	Fringes
MASON - STONE.....	\$ 33.39	20.06

BROH0008-001 06/01/2024		

COLUMBIANA (Salem, Perry, Fairfield, Center, Elk Run, Middleton, & Unity Townships and the city of New Waterford),
MAHONING & TRUMBULL

	Rates	Fringes
BRICKLAYER.....	\$ 33.39	20.06

BROH0009-002 06/01/2024		

BELMONT & MONROE COUNTIES and the Townships of Warren & Mt. Pleasant and the Village of Dillonvale in JEFFERSON COUNTY

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06
Refractory.....	\$ 31.45	19.01

BROH0010-002 06/01/2024		

COLUMBIANA (St. Clair, Madison, Wayne, Franklin, Washington, Yellow Creek & Liverpool Townships) & JEFFERSON (Brush Creek & Saline Townships)

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0014-002 06/01/2024		

HARRISON & JEFFERSON (Except Mt. Pleasant, Warren, Brush Creek, Saline & Salineville Townships & the Village of Dillonvale)

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0016-002 06/01/2023		

ASHTABULA, GEAUGA, and LAKE COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 32.40	19.30

BROH0018-002 06/01/2024		

BROWN, BUTLER, CLERMONT, HAMILTON, PREBLE (Gasper, Dixon, Israel, Lanier, Somers & Gratis Townships) & WARREN COUNTIES:

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

 BROH0022-004 06/01/2024

CHAMPAIGN, CLARK, CLINTON, DARKE, GREENE, HIGHLAND, LOGAN,
 MIAMI, MONTGOMERY, PREBLE (Jackson, Monroe, Harrison, Twin,
 Jefferson & Washington Townships) and SHELBY COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0032-001 06/01/2024

GALLIA & MEIGS

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0035-002 06/01/2024

ALLEN, AUGLAIZE, MERCER and VAN WERT COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0039-002 06/01/2024

ADAMS & SCIOTO

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

BROH0040-003 06/01/2024

ASHLAND, CRAWFORD, HARDIN, HOLMES, MARION, MORROW, RICHLAND,
 WAYNE and WYANDOT (Except Crawford, Ridge, Richland & Tymochtee
 Townships) COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

FOOTNOTE: Layout Man and Sawman rate: \$1.00 per hour above
 journeyman rate.
 Free standing stack work ground level to top of stack;
 Sandblasting and laying of carbon masonry material in swing
 stage and/or scaffold; Ramming and spading of plastics and
 gunniting: \$1.50 per hour above journeyman rate.
 ""Hot"" work: \$2.50 above journeyman rate.

 BROH0044-002 06/01/2024

	Rates	Fringes
Bricklayer, Stonemason COSHOCTON, FAIRFIELD, GUERNSEY, HOCKING, KNOX, KICKING, MORGAN, MUSKINGUM, NOBLE (Beaver, Buffalo, Seneca & Wayne Townships) & PERRY COUNTIES:.....	\$ 33.39	20.06

BROH0045-002 06/01/2023

FAYETTE, JACKSON, PIKE, ROSS and VINTON COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 35.39	17.47

 BROH0046-002 06/01/2024

ERIE, HANCOCK, HURON, OTTAWA, SANDUSKY, SENECA, WOOD (Perry & Bloom Townships) and WYANDOT (Tymochtee, Crawford, Ridge & Richland Townships) COUNTIES & the Islands of Lake Erie north of Sandusky

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

FOOTNOTE: Layout Man and Sawman rate: \$1.00 per hour above journeyman rate.
 Free standing stack work ground level to top of stack;
 Sandblasting and laying of carbon masonry material in swing stage and/or scaffold; Ramming and spading of plastics and gunniting: \$1.50 per hour above journeyman rate.
 ""Hot"" work: \$2.50 above journeyman rate.

 BROH0052-001 06/01/2024

ATHENS COUNTY

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

 BROH0052-003 06/01/2024

NOBLE (Brookfield, Noble, Center, Sharon, Olive, Enoch, Stock, Jackson, Jefferson & Elk Townships) and WASHINGTON COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

 BROH0055-003 06/01/2024

DELAWARE, FRANKLIN, MADISON, PICKAWAY and UNION COUNTIES

	Rates	Fringes
Bricklayer, Stonemason.....	\$ 33.39	20.06

 CARP0002-024 05/01/2025

BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, DARKE, GREENE, HAMILTON, LOGAN, MIAMI, MONTGOMERY, PREBLE, SHELBY & WARREN

	Rates	Fringes
Carpenter & Piledrivermen.....	\$ 35.94	23.59
Diver.....	\$ 40.58	9.69

 CARP0171-001 05/01/2025

MAHONING & TRUMBULL

	Rates	Fringes
CARPENTER.....	\$ 33.19	25.02

 CARP0171-002 05/01/2025

BELMONT, COLUMBIANA, HARRISON, JEFFERSON & MONROE

	Rates	Fringes
CARPENTER.....	\$ 32.50	26.19

CARP0200-002 05/01/2025

ADAMS, ATHENS, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA,
GUERNSEY, HIGHLAND, HOCKING, JACKSON, LAWRENCE, LICKING,
MADISON, MARION, MEIGS, MORGAN, MUSKINGUM, NOBLE, PERRY,
PICKAWAY, PIKE, ROSS, SCIOTO, UNION, VINTON and WASHINGTON
COUNTIES

	Rates	Fringes
CARPENTER.....	\$ 35.94	23.59
Diver.....	\$ 39.41	10.40
PILEDRIVERMAN.....	\$ 35.94	23.59

CARP0285-001 05/01/2025

CARROLL, STARK, TUSCARAWAS and WAYNE

	Rates	Fringes
CARPENTER.....	\$ 34.07	24.28

CARP0285-002 05/01/2025

COSHOCOTON, HOLMES, KNOX & MORROW

	Rates	Fringes
CARPENTER.....	\$ 33.38	24.69

CARP0285-008 05/01/2025

MEDINA, PORTAGE & SUMMIT

	Rates	Fringes
CARPENTER.....	\$ 37.18	25.07

CARP0351-005 05/01/2025

LUCAS & WOOD

	Rates	Fringes
CARPENTER.....	\$ 35.44	27.56

CARP0351-006 05/01/2025

	Rates	Fringes
CARPENTER DEFIANCE, FULTON, HANCOCK, HENRY, PAULDING & WILLIAMS COUNTIES.....	\$ 32.05	26.13

CARP0372-002 05/01/2025

ALLEN, AUGLAIZE, HARDIN, MERCER, PUTNAM & VAN WERT

	Rates	Fringes
CARPENTER.....	\$ 31.80	26.33

CARP0435-005 05/01/2025

ASHTABULA, CUYAHOGA, GEAUGA & LAKE

	Rates	Fringes
CARPENTER.....	\$ 38.57	24.64

CARP0735-001 05/01/2025

ASHLAND, HURON & RICHLAND

	Rates	Fringes
CARPENTER.....	\$ 34.67	23.57

CARP0735-002 05/01/2025		
LORAIN		
	Rates	Fringes
CARPENTER.....	\$ 38.42	24.01

CARP0735-004 05/01/2025		
ERIE		
	Rates	Fringes
CARPENTER.....	\$ 36.71	24.14

CARP0744-001 05/01/2025		
CRAWFORD, OTTAWA, SANDUSKY, SENECA & WYANDOT		
	Rates	Fringes
CARPENTER.....	\$ 33.74	27.05

CARP1090-002 05/01/2025		
ALLEN, AUGLAIZE, HARDIN, MERCER, PUTNAM, VAN WERT & WYANDOT		
	Rates	Fringes
Piledrivermen & Diver's Tender...	\$ 35.94	28.39

DIVERS - \$250.00 per day		

CARP1090-003 05/01/2025		
BELMONT, HARRISON, & MONROE		
	Rates	Fringes
Diver, Wet.....	\$ 58.52	24.91
Piledrivermen; Diver, Dry.....	\$ 39.01	24.91

CARP1090-004 05/01/2025		
CARROLL, STARK, TUSCARAWAS & WAYNE		
	Rates	Fringes
Diver, Wet.....	\$ 49.82	25.40
Piledrivermen; Diver, Dry.....	\$ 33.21	25.40

CARP1090-005 05/01/2025		
ASHLAND, ASHTABULA, CUYAHOGA, ERIE, GEAUGA, HURON, LAKE, LORAIN, MEDINA, PORTAGE, RICHLAND & SUMMIT		
	Rates	Fringes
Diver, Wet.....	\$ 54.51	27.50
Piledrivermen; Diver, Dry.....	\$ 36.34	27.50

CARP1090-006 05/01/2025		
COSHOCOTON, HOLMES, KNOX & MORROW		
	Rates	Fringes
Diver, Wet.....	\$ 54.36	22.54
Piledrivermen; Diver, Dry.....	\$ 36.24	22.54

CARP1090-007 05/01/2025

MAHONING & TRUMBULL

	Rates	Fringes
Diver, Wet.....	\$ 50.85	24.82
Piledrivermen; Diver, Dry.....	\$ 33.90	24.82

CARP1090-008 05/01/2025

COLUMBIANA & JEFFERSON

	Rates	Fringes
PILEDRIVERMAN.....	\$ 39.01	24.91

CARP1090-009 05/01/2025

CRAWFORD, DEFIANCE, FULTON, HANCOCK, HENRY, LUCAS, OTTAWA,
PAULDING, SANDUSKY, SENECA, WILLIAMS & WOOD

	Rates	Fringes
Piledrivermen & Diver's Tender...	\$ 37.98	28.63

DIVERS - \$250.00 per day

ELEC008-002 05/27/2024

DEFIANCE, FULTON, HANCOCK, HENRY, LUCAS, OTTAWA, PAULDING,
PUTNAM, SANDUSKY, SENECA, WILLIAMS & WOOD

	Rates	Fringes
CABLE SPLICER.....	\$ 38.98	18.96
ELECTRICIAN.....	\$ 48.40	4.5%+23.06

ELEC0032-003 06/01/2025

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY, VAN WERT &
WYANDOT (Crawford, Jackson, Marseilles, Mifflin, Ridgeland,
Ridge & Salem Townships)

	Rates	Fringes
ELECTRICIAN.....	\$ 39.17	23.60

ELEC0038-002 04/28/2025

CUYAHOGA, GEAUGA (Bainbridge, Chester & Russell Townships) &
LORAIN (Columbia Township)

	Rates	Fringes
ELECTRICIAN Excluding Sound & Communications Work.....	\$ 46.63	24.92

FOOTNOTES;

- 6 Paid Holidays: New Year's Day; Memorial Day; July 4th; Labor Day; Thanksgiving Day; & Christmas Day
- 1 week's paid vacation for 1 year's service; 2 weeks' paid vacation for 2 or more years' service

ELEC0038-008 04/28/2025

CUYAHOGA, GEAUGA (Bainbridge, Chester & Russell Townships) &
LORAIN (Columbia Township)

	Rates	Fringes
Sound & Communication Technician		
Communications Technician...\$ 34.30		14.95
Installer Technician.....\$ 33.05		14.91

FOOTNOTES;

- a. 6 Paid Holidays: New Year's Day; Memorial Day; July 4th; Labor Day; Thanksgiving Day; & Christmas Day
- b. 1 week's paid vacation for 1 year's service; 2 weeks' paid vacation for 2 or more years' service

ELEC0064-003 11/25/2024

COLUMBIANA (Butler, Fairfield, Perry, Salem & Unity Townships)
 MAHONING (Austintown, Beaver, Berlin, Boardman, Canfield, Ellsworth, Coitsville, Goshen, Green, Jackson, Poland, Springfield & Youngstown Townships), & TRUMBULL (Hubbard & Liberty Townships)

	Rates	Fringes
ELECTRICIAN.....\$ 39.80		21.03

ELEC0071-005 01/06/2025

ASHTABULA, CUYAHOGA, GEAUGA, LAKE & LORAIN

	Rates	Fringes
LINE CONSTRUCTION: Equipment Operator		
DOT/Traffic Signal & Highway Lighting Projects...\$ 39.97		27%+8.00
Municipal Power/Transit Projects.....\$ 49.46		27%+8.25
LINE CONSTRUCTION: Groundman		
DOT/Traffic Signal & Highway Lighting Projects...\$ 31.10		27%+8.00
Municipal Power/Transit Projects.....\$ 38.47		27%+8.25
LINE CONSTRUCTION: Linemen/Cable Splicer		
DOT/Traffic Signal & Highway Lighting Projects...\$ 43.89		27%+8.00
Municipal Power/Transit Projects.....\$ 54.96		27%+8.25

ELEC0071-010 01/06/2025

Statewide

	Rates	Fringes
Line Construction		
Equipment Operator.....\$ 40.44		4%+16.09
Groundman.....\$ 29.07		4%+13.81
Lineman & Cable Splicers....\$ 46.02		4%+17.20

ELEC0082-002 12/02/2024

CLINTON, DARKE, GREENE, MIAMI, MONTGOMERY, PREBLE & WARREN
 (Wayne, Clear Creek & Franklin Townships)

	Rates	Fringes
ELECTRICIAN.....\$ 38.00		22.49

* ELEC0082-006 11/25/2024

CLINTON, DARKE, GREENE, MIAMI, MONTGOMERY, PREBLE & WARREN
 (Wayne, Clear Creek & Franklin Townships)

	Rates	Fringes
Sound & Communication Technician		
Cable Puller.....	\$ 13.85 **	5.30
Installer/Technician.....	\$ 27.70	15.71

ELEC0129-003 02/24/2025		
LORAIN (Except Columbia Township) & MEDINA (Litchfield & Liverpool Townships)		

	Rates	Fringes
ELECTRICIAN.....	\$ 42.95	18.81

ELEC0129-004 02/24/2025		

ERIE & HURON (Lyme, Ridgefield, Norwalk, Townsend, Wakeman, Sherman, Peru, Bronson, Hartland, Clarksfield, Norwich, Greenfield, Fairfield, Fitchville & New London Townships)

	Rates	Fringes
ELECTRICIAN.....	\$ 42.95	18.81

ELEC0141-003 06/02/2025		

BELMONT COUNTY

	Rates	Fringes
CABLE SPLICER.....	\$ 42.94	27.74
ELECTRICIAN.....	\$ 39.25	31.23

ELEC0212-003 11/26/2018		

BROWN, CLERMONT & HAMILTON

	Rates	Fringes
Sound & Communication Technician.....		
	\$ 24.35	10.99

ELEC0212-005 06/02/2025		

BROWN, CLERMONT, and HAMILTON COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 38.05	22.97

ELEC0245-001 08/26/2024		

ALLEN, HARDIN, VAN WERT & WYANDOT (Crawford, Jackson, Marseilles, Mifflin, Richland, Ridge & Salem Townships)

	Rates	Fringes
Line Construction		
Equipment Operator.....	\$ 32.95	28%+7.85
Groundman Truck Driver.....	\$ 20.59	28%+7.85
Lineman.....	\$ 47.07	28%+7.85

FOOTNOTE: a. Half day's Paid Holiday: The last 4 hours of the workday prior to Christmas or New Year's Day

ELEC0245-003 01/01/2025		
DEFIANCE, FULTON, HANCOCK, HENRY, HURON, LUCAS, OTTAWA,		

PAULDING, PUTNAM, SANDUSKY, SENECA, WILLIAMS, and WOOD COUNTIES

	Rates	Fringes
Line Construction		
Cable Splicer.....	\$ 53.90	8.10+28%
Groundman/Truck Driver.....	\$ 20.51	8.10+28%
Heli-arc Welding.....	\$ 47.17	8.10+28%
Lineman.....	\$ 46.87	8.10+28%
Operator - Class 1.....	\$ 37.50	8.10+28%
Operator - Class 2.....	\$ 32.81	8.10+28%
Traffic Signal & Lighting		
Technician.....	\$ 42.18	8.10+28%

FOOTNOTE: a. 6 Observed Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; & Christmas Day. Employees who work on a holiday shall be paid at a rate of double their applicable classified straight-time rates for the work performed on such holiday.

ELEC0245-004 01/01/2025

ERIE COUNTY

	Rates	Fringes
Line Construction		
Cable Splicer.....	\$ 53.90	28%+8.10
Groundman/Truck Driver.....	\$ 20.51	28%+8.10
Lineman.....	\$ 46.87	28%+8.10
Operator - Class 1.....	\$ 37.50	28%+8.10
Operator - Class 2.....	\$ 32.81	28%+8.10

FOOTNOTE: a. 6 Observed Holidays: New Year's Day; Memorial Day; Independence Day; Labor Day; Thanksgiving Day; & Christmas Day. Employees who work on a holiday shall be paid at a rate of double their applicable classified straight-time rates for the work performed on such holiday.

ELEC0246-001 10/28/2024

Carroll, Columbiana, Harrison and Jefferson Counties in Ohio;
Brooke and Hancock Counties in West Virginia.

	Rates	Fringes
ELECTRICIAN.....	\$ 44.00	30.38%+24.31

FOOTNOTE: a. 1 1/2 Paid Holidays: The last scheduled workday prior to Christmas & 4 hours on Good Friday.

ELEC0306-005 05/27/2024

MEDINA (Brunswick, Chatham, Granger, Guilford, Harrisville, Hinckley, Homer, Lafayette, Medina, Montville, Sharon, Spencer, Wadsworth, Westfield & York Townships), PORTAGE (Atwater, Aurora, Brimfield, Deerfield, Franklin, Mantua, Randolph, Ravenna, Rootstown, Shalersville, Streetsboro & Suffield Townships), SUMMIT & WAYNE (Baughman, Canaan, Chester, Chippewa, Congress, Green, Milton, & Wayne Townships)

	Rates	Fringes
CABLE SPLICER.....	\$ 46.81	20.95
ELECTRICIAN.....	\$ 42.55	20.95

ELEC0317-002 06/02/2025

GALLIA & LAWRENCE

	Rates	Fringes
CABLE SPLICER.....	\$ 32.68	18.13
ELECTRICIAN.....	\$ 41.15	29.35

ELEC0540-005 06/30/2025

CARROLL (Northern half, including Fox, Harrison, Rose & Washington Townships), COLUMBIANA (Knox Township), HOLMES, MAHONING (Smith Township), STARK, TUSCARAWAS (North of Auburn, Clay, Rush & York Townships), and WAYNE (South of Baughman, Chester, Green & Wayne Townships) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 39.86	29.19

ELEC0573-003 06/01/2025

ASHTABULA (Colebrook, Wayne, Williamsfield, Orwell & Windsor Townships), GEAUGA (Auburn, Middlefield, Parkman & Troy Townships), MAHONING (Milton Township), PORTAGE (Charlestown, Edinburg, Freedom, Hiram, Nelson, Palmyra, Paris & Windham Townships), and TRUMBULL (Except Liberty & Hubbard Townships)

	Rates	Fringes
ELECTRICIAN.....	\$ 42.20	23.37

ELEC0575-001 05/29/2023

ADAMS, FAYETTE, HIGHLAND, HOCKING, JACKSON (Bloomfield, Franklin, Hamilton, Jefferson, Lick, Madison, Scioto, Coal, Jackson, Liberty, Milton & Washington Townships), PICKAWAY (Deer Creek, Perry, Pickaway, Salt Creek & Wayne Townships), PIKE (Beaver, Benton, Jackson, Mifflin, Pebble, PeePee, Perry, Seal, Camp Creek, Newton, Scioto, Sunfish, Union & Marion Townships), ROSS, SCIOTO & VINTON (Clinton, Eagle, Elk, Harrison, Jackson, Richland & Swan Townships)

	Rates	Fringes
ELECTRICIAN.....	\$ 37.00	22.26

ELEC0648-001 09/01/2025

BUTLER and WARREN COUNTIES (Deerfield, Hamilton, Harlan, Massie, Salem, Turtle Creek, Union & Washington Townships)

	Rates	Fringes
CABLE SPLICER.....	\$ 30.50	18.23
ELECTRICIAN.....	\$ 38.00	24.162

* ELEC0673-004 05/26/2025

ASHTABULA (Excluding Orwell, Colebrook, Williamsfield, Wayne & Windsor Townships), GEAUGA (Burton, Chardon, Claridon, Hambden, Huntsburg, Montville, Munson, Newbury & Thompson Townships) and LAKE COUNTIES

	Rates	Fringes
CABLE SPLICER.....	\$ 33.81	21.47
ELECTRICIAN.....	\$ 41.17	24.58

* ELEC0683-002 06/02/2025

CHAMPAIGN, CLARK, DELAWARE, FAIRFIELD, FRANKLIN, MADISON, PICKAWAY (Circleville, Darby, Harrison, Jackson, Madison, Monroe, Muhlenberg, Scioto, Walnut & Washington Townships), and

UNION COUNTIES

	Rates	Fringes
CABLE SPLICER.....	\$ 44.00	26.40
ELECTRICIAN.....	\$ 43.00	26.37

ELEC0688-003 05/30/2022

ASHLAND, CRAWFORD, HURON (Richmond, New Haven, Ripley & Greenwich Townships), KNOX (Liberty, Clinton, Union, Howard, Monroe, Middleberry, Morris, Wayne, Berlin, Pike, Brown & Jefferson Townships), MARION, MORROW, RICHLAND and WYANDOT (Sycamore, Crane, Eden, Pitt, Antrim & Tymochtee Townships) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 32.30	21.83

ELEC0972-002 06/01/2024

ATHENS, MEIGS, MONROE, MORGAN, NOBLE, VINTON (Brown, Knox, Madison, Vinton & Wilkesville Townships), and WASHINGTON COUNTIES

	Rates	Fringes
CABLE SPLICER.....	\$ 40.25	33.33
ELECTRICIAN.....	\$ 40.00	33.32

ELEC1105-001 05/27/2024

COSHOCTON, GUERNSEY, KNOX (Jackson, Clay, Morgan, Miller, Milford, Hilliar, Butler, Harrison, Pleasant & College Townships), LICKING, MUSKINGUM, PERRY, and TUSCARAWAS (Auburn, York, Clay, Jefferson, Rush, Oxford, Washington, Salem, Perry & Bucks Townships) COUNTIES

	Rates	Fringes
ELECTRICIAN.....	\$ 39.60	24.41

ENGI0018-003 05/01/2024

ASHTABULA, CUYAHOGA, ERIE, GEauga, LAKE, LORAIN, MEDINA, PORTAGE, and SUMMIT COUNTIES

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 45.63	16.41
GROUP 2.....	\$ 45.53	16.41
GROUP 3.....	\$ 44.49	16.41
GROUP 4.....	\$ 43.27	16.41
GROUP 5.....	\$ 37.98	16.41
GROUP 6.....	\$ 46.63	16.41
GROUP 7.....	\$ 46.63	16.41

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Gradall; Helicopter Crew

(Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; Wheel Excavator; and Asphalt Plant Engineer (Cleveland District Only).

GROUP 2 - Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Horizontal Directional Drill (Over 50,000 ft lbs thrust); Hydro Milling Machine; Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); Vermeer type Concrete Saw; and Maintenance Operators (Portage and Summit Counties Only).

GROUP 3 - A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer (Portage and Summit Counties Only); Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller, Asphalt; Rotovator (lime soil stabilizer); Switch & Tie Tampers (without lifting & aligning device); Utility Operator (Small equipment); Welding Machines; and Railroad Tie Insertor/Remover; Articulating/straight bed end dumps if assigned (minus \$4.00 per hour).

GROUP 4 - Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway); Finishing Machine; Fireperson, Floating Equipment (all types); Forklift; Form Trencher; Hydro Hammer expect masonry; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); and Vibratory Compactor with Integral Power.

GROUP 5 - Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt Plant); Generator; Masonry Fork Lift; Inboard-Outboard Motor Boat Launch; Oil Heater (asphalt plant); Oiler/Helper; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signaller; Tire Repairperson; VAC/ALLS; Cranes - Compact, track or rubber under 4,000 pound capacity; fueling and greasing; and Chainmen.

GROUP 6 - Master Mechanic & Boom from 150 to 180.

GROUP 7 - Boom from 180 and over.

ENGI0018-004 05/01/2024

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, and YANDOT COUNTIES

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
GROUP 1.....	\$ 44.14	16.41
GROUP 2.....	\$ 44.02	16.41
GROUP 3.....	\$ 42.98	16.41
GROUP 4.....	\$ 41.80	16.41
GROUP 5.....	\$ 36.34	16.41
GROUP 6.....	\$ 45.14	16.41
GROUP 7.....	\$ 45.14	16.41

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Gradall; Helicopter Crew (Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; and Wheel Excavator.

GROUP 2 - Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Hydro Milling Machine; Horizontal Directional Drill (over 50,000 ft. lbs. thrust); Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); and Vermeer type Concrete Saw.

GROUP 3 - A-Frame; Air Compressor on Tunnel Work (low pressure); Asphalt Plant Engineer; Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Railroad Tie Insertor/Remover; Roller, Asphalt; Rotovator (lime soil

stabilizer); Switch & Tie Tamper (without lifting & aligning device); Utility Operator (Small equipment); and Welding Machines; Articulating/straight bed end dumps if assigned (minus \$4.00 per hour).

GROUP 4 - Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway); Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift; Form Trencher; Hydro Hammer except masonry; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); and Vibratory Compactor with Integral Power.

GROUP 5 - Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt Plant); Generator; Masonary Forklift; Inboard-Outboard Motor Boat Launch; Oil Heater (asphalt plant); Oiler/Helper; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; VAC/ALLS; Cranes - Compact, track or rubber under 4,000 pound capacity; fueling and greasing; and Chainmen.

GROUP 6 - Master Mechanic & Boom from 150 to 180.

GROUP 7 - Boom from 180 and over.

ENGI0066-023 06/01/2023

COLUMBIANA, MAHONING & TRUMBULL COUNTIES

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
ASBESTOS; HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 1 - A & B.....	\$ 44.63	24.30
ASBESTOS; HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 2 - A & B.....	\$ 44.30	24.30
ASBESTOS; HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 3 - A & B.....	\$ 38.47	24.30
ASBESTOS; HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 4 - A & B.....	\$ 34.52	24.30
ASBESTOS; HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 5 - A & B.....	\$ 31.13	24.30
HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 1 - C & D.....	\$ 40.91	24.30
HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 2 - C & D.....	\$ 40.61	24.30
HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 3 - C & D.....	\$ 35.27	24.30
HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 4 - C & D.....	\$ 31.65	24.30
HAZARDOUS/TOXIC WASTE PROJECTS		
GROUP 5 - C & D.....	\$ 28.53	24.30
ALL OTHER WORK		
GROUP 1.....	\$ 37.19	24.30
ALL OTHER WORK		
GROUP 2.....	\$ 36.92	24.30

ALL OTHER WORK		
GROUP 3.....	\$ 32.06	24.30
ALL OTHER WORK		
GROUP 4.....	\$ 28.77	24.30
ALL OTHER WORK		
GROUP 5.....	\$ 25.94	24.30

GROUP 1 - Rig, Pile Driver or Caisson Type; & Rig, Pile Hydraulic Unit Attached

GROUP 2 - Asphalt Heater Planer; Backfiller with Drag Attachment; Backhoe; Backhoe with Shear attached; Backhoe-Rear Pivotal Swing; Batch Plant-Central Mix Concrete; Batch Plant, Portable concrete; Berm Builder-Automatic; Boat Derrick; Boat-Tug; Boring Machine Attached to Tractor; Bullclam; Bulldozer; C.M.I. Road Builder & Similar Type; Cable Placer & Layer; Carrier-Straddle; Carryall-Scraper or Scoop; Chicago Boom; Compactor with Blade Attached; Concrete Saw (Vermeer or similar type); Concrete Spreader Finisher; Combination, Bidwell Machine; Crane; Crane-Electric Overhead; Crane-Rough Terrain; Crane-Side Boom; Crane-Truck; Crane-Tower; Derrick-Boom; Derrick-Car; Digger-Wheel (Not trencher or road widener); Double Nine; Drag Line; Dredge; Drill-Kenny or Similar Type; Easy Pour Median Barrier Machine (or similar type); Electromatic; Frankie Pile; Gradall; Grader; Gurry; Self-Propelled; Heavy Equipment Robotics Operator/Mechanic; Hoist-Monorail; Hoist-Stationary & Mobile Tractor; Hoist, 2 or 3 drum; Horizontal Directional Drill Operator; Jackall; Jumbo Machine; Kocal & Kuhlman; Land-Seagoing Vehicle; Loader, Elevating; Loader, Front End; Loader, Skid Steer; Locomotive; Mechanic/Welder; Metro Chip Harvester with Boom; Mucking Machine; Paver-Asphalt Finishing Machine; Paver-Road Concrete; Paver-Slip Form (C.M.I. or similar); Place Crete Machine with Boom; Post Driver (Carrier mounted); Power Driven Hydraulic Pump & Jack (When used in Slip Form or Lift Slab Construction); Pump Crete Machine; Regulator-Ballast; Hydraulic Power Unit not attached to Rig for Pile Drillings; Rigs-Drilling; Roto Mill or similar Full Lane (8' Wide & Over); Roto Mill or similar type (Under 8'); Shovel; Slip Form Curb Machine; Speedwing; Spikemaster; Stonecrusher; Tie Puller & Loader; Tie Tamper; Tractor-Double Boom; Tractor with Attachments; Truck-Boom; Truck-Tire; Trench Machine; Tunnel Machine (Mark 21 Java or similar); & Whirley (or similar type)

GROUP 3 - Asphalt Plant; Bending Machine (Pipeline or similar type); Boring machine, Motor Driven; Chip Harvester without Boom; Cleaning Machine, Pipeline Type; Coating Machine, Pipeline Type; Compactor; Concrete Belt Placer; Concrete Finisher; Concrete Planer or Asphalt; Concrete Spreader; Elevator; Fork Lift (Home building only); Fork lift & Lulls; Fork Lift Walk Behind (Hoisting over 1 buck high); Form Line Machine; Grease Truck operator; Grout Pump; Gunnite Machine; Horizontal Directional Drill Locator; Single Drum Hoist with or without Tower; Huck Bolting Machine; Hydraulic Scaffold (Hoisting building materials); Paving Breaker (Self-propelled or Ridden); Pipe Dream; Pot Fireperson (Power Agitated); Refrigeration Plant; Road Widener; Roller; Sasgen Derrick; Seeding Machine; Soil Stabilizer (Pump type); Spray Cure Machine, Self-Propelled; Straw Blower Machine; Sub-Grader; Tube Finisher or Broom C.M.I. or similar type; & Tugger Hoist

GROUP 4 - Air Curtain Destructor & Similar Type; Batch Plant-Job Related; Boiler Operator; Compressor; Conveyor; Curb Builder, self-propelled; Drill Wagon; Generator Set; Generator-Steam; Heater-Portable Power; Hydraulic Manipulator Crane; Jack-Hydraulic Power driven; Jack-Hydraulic (Railroad); Ladavator; Minor Machine Operator; Mixer-Concrete; Mulching Machine; Pin Puller; Power Broom; Pulverizer; Pump; Road Finishing Machine (Pull Type); Saw-Concrete-Self-Propelled (Highway Work); Signal Person; Spray Cure Machine-Motor Powered; Stump Cutter; Tractor; Trencher Form; Water Blaster; Steam Jenny;

Syphon; Vibrator-Gasoline; & Welding Machine

GROUP 5 - Brakeperson; Fireperson; & Oiler

IRON0017-002 05/01/2024

ASHTABULA (North of Route 6, starting at the Geauga County Line, proceeding east to State Route 45), CUYAHOGA, ERIE (Eastern 2/3), GEAUGA, HURON (East of a line drawn from the north border through Monroeville & Willard), LAKE, LORAIN, MEDINA (North of Old Rte. #224), PORTAGE (West of a line from Middlefield to Shalersville to Deerfield), and SUMMIT (North of Old Rte. #224, including city limits of Barberton) COUNTIES

	Rates	Fringes

IRONWORKER

Ornamental, Reinforcing, & Structural.....	\$ 36.83	29.01

IRON0017-010 05/01/2024

ASHTABULA (Eastern part from Lake Erie on the north to route #322 on the south to include Conneaut, Kingsville, Sheffield, Denmark, Dorset, Cherry Valley, Wayne, Monroe, Pierpont, Richmond, Andover & Williamsfield Townships)

	Rates	Fringes

IRONWORKER

Structural, including metal building erection & Reinforcing.....	\$ 36.83	29.01

IRON0044-001 06/01/2025

ADAMS (Western Part), BROWN, BUTLER (Southern Part), CLERMONT, CLINTON (South of a line drawn from Blanchester to Lynchburg), HAMILTON, HIGHLAND (Excluding eastern one-fifth & portion of county inside lines drawn from Marshall to Lynchburg from the northern county line through E. Monroe to Marshall) and WARREN (South of a line drawn from Blanchester through Morrow to the west county line) COUNTIES

	Rates	Fringes

IRONWORKER, REINFORCING.....	\$ 38.27	23.90

IRON0044-002 06/01/2025

CLINTON (South of a line drawn from Blanchester to Lynchburg), HAMILTON, HIGHLAND (Excluding eastern one-fifth & portion of county inside lines drawn from Marshall to Lynchburg from the northern county line through E. Monroe to Marshall) & WARREN (South of a line drawn from Blanchester through Morrow to the west county line)

	Rates	Fringes

IRONWORKER

Fence Erector.....	\$ 35.88	23.90
Ornamental; Structural.....	\$ 37.77	23.90

IRON0055-003 07/01/2024

CRAWFORD (Area Between lines drawn from where Hwy #598 & #30 meet through N. Liberty to the northern border & from said Hwy junction point due west to the border), DEFIANCE (S. of a line drawn from where Rte. #66 meets the northern line through Independence to the eastern county border), ERIE (Western 1/3), FULTON, HANCOCK, HARDIN (North of a line drawn from Maysville

to a point 4 miles south of the northern line on the eastern line), HENRY, HURON (West of a line drawn from the northern border through Monroeville & Willard), LUCAS, OTTAWA, PUTNAM (East of a line drawn from the northern border down through Miller City to where #696 meets the southern border), SANDUSKY, SENECA, WILLIAMS (East of a line drawn from Pioneer through Stryker to the southern border), WOOD & WYANDOT (North of Rte. #30)

	Rates	Fringes
IRONWORKER		
Fence Erector.....	\$ 26.40	24.62
Flat Road Mesh.....	\$ 29.77	21.30
Tunnels & Caissons Under Pressure.....	\$ 29.77	21.30
All Other Work.....	\$ 35.50	29.20

IRON0147-002 06/01/2025

ALLEN (Northern half), DEFIANCE (Northern part, excluding south of a line drawn from where Rte. #66 meets the northern line through Independence to the eastern county border), MERCER (Northern half), PAULDING, PUTNAM (Western part, excluding east of a line drawn from the northern border down through Miller City to where #696 meets the southern border), VAN WERT, and WILLIAMS (Western part, excluding east of a line drawn from Pioneer through Stryker to the southern border) COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 38.00	26.39

IRON0172-002 06/01/2025

CHAMPAIGN (Eastern one-third), CLARK (Eastern one-fourth), COSHOCTON (West of a line beginning at the northwestern county line going through Walhonding & Tunnel Hill to the southern county line), CRAWFORD (South of Rte. #30), DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, HARDIN (Excluding a line drawn from Roundhead to Maysville), HIGHLAND (Eastern one-fifth), HOCKING, JACKSON (Northern half), KNOX, LICKING, LOGAN (Eastern one-third), MADISON, MARION, MORROW, MUSKINGUM (West of a line starting at Adams Mill going to Adamsville & going from Adamsville through Blue Rock to the southern border), PERRY, PICKAWAY, PIKE (Northern half), ROSS, UNION, VINTON and WYANDOT (South of Rte. #30) COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 40.87	23.15

IRON0207-004 06/01/2025

ASHTABULA (Southern part starting at the Geauga County line), COLUMBIANA (E. of a line from Damascus to Highlandtown), MAHONING (N. of Old Route #224), PORTAGE (E. of a line from Middlefield to Shalersville to Deerfield) & TRUMBULL

	Rates	Fringes
IRONWORKER		
Layout; Sheeter.....	\$ 37.26	28.16
Ornamental; Reinforcing; Structural.....	\$ 36.26	28.16

IRON0290-002 06/01/2025

ALLEN (Southern half), AUGLAIZE, BUTLER (North of a line drawn from east to the west county line going through Oxford, Darrtown & Woodsdale), CHAMPAIGN (Excluding east of a line drawn from Catawla to the point where #68 intersects the

northern county line), CLARK (Western two-thirds), CLINTON (Excluding south of a line drawn from Blanchester to Lynchburg), DARKE, GREENE, HIGHLAND (Inside lines drawn from Marshall to Lynchburg & from the northern county line through East Monroe to Marshall), LOGAN (West of a line drawn from West Liberty to where the northern county line meets the western county line of Hardin), MERCER (Southern half), MIAMI, MONTGOMERY, PREBLE, SHELBY & WARREN (Excluding south of a line drawn from Blanchester through Morrow to the western county line) COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 37.39	25.35

IRON0549-003 12/01/2022		

BELMONT, GUERNSEY, HARRISON, JEFFERSON, MONROE & MUSKINGUM (Excluding portion west of a line starting at Adams Mill going to Adamsville and going from Adamsville through Blue Rock to the south border)

	Rates	Fringes
IRONWORKER.....	\$ 35.19	25.66

IRON0550-004 05/01/2024		

ASHLAND, CARROLL, COLUMBIANA (W. of a line from Damascus to Highlandtown), COSHOCTON (E. of a line beginning at NW Co. line going through Walhonding & Tunnel Hill to the South Co. line), HOLMES, HURON (S. of Old Rte. #224), MAHONING (S. of Old Rte. #224), MEDINA (S. of Old Rte. #224), PORTAGE (S. of Old Rte. #224), RICHLAND, STARK, SUMMIT (S. of Old Rte. #224, Excluding city limits of Barberton), TUSCARAWAS, & WAYNE

	Rates	Fringes
Ironworkers:Structural, Ornamental and Reinforcing.....	\$ 34.70	22.88

IRON0769-004 06/01/2025		

ADAMS (Eastern Half), GALLIA, JACKSON (Southern Half), LAWRENCE & SCIOTO

	Rates	Fringes
IRONWORKER.....	\$ 39.70	29.59

IRON0787-003 06/01/2025		

ATHENS, MEIGS, MORGAN, NOBLE, and WASHINGTON COUNTIES

	Rates	Fringes
IRONWORKER.....	\$ 36.10	24.65

LAB00265-008 05/01/2024		

	Rates	Fringes
LABORER		
ASHTABULA, ERIE, HURON, LORAIN, LUCAS, MAHONING, MEDINA, OTTAWA, PORTAGE, SANDUSKY, STARK, SUMMIT, TRUMBULL & WOOD COUNTIES		
GROUP 1.....	\$ 35.95	14.45
GROUP 2.....	\$ 36.12	14.45
GROUP 3.....	\$ 36.45	14.45
GROUP 4.....	\$ 36.90	14.45

CUYAHOGA AND GEAUGA COUNTIES ONLY: SEWAGE PLANTS, WASTE PLANTS, WATER TREATMENT FACILITIES, PUMPING STATIONS, & ETHANOL PLANTS CONSTRUCTION.....\$ 38.56			14.45
CUYAHOGA, GEAUGA & LAKE COUNTIES			
GROUP 1.....\$ 37.18			14.45
GROUP 2.....\$ 37.35			14.45
GROUP 3.....\$ 37.68			14.45
GROUP 4.....\$ 38.13			14.45
REMAINING COUNTIES OF OHIO			
GROUP 1.....\$ 35.52			14.45
GROUP 2.....\$ 35.69			14.45
GROUP 3.....\$ 36.02			14.45
GROUP 4.....\$ 36.47			14.45

LABORER CLASSIFICATIONS

GROUP 1 - Asphalt Laborer; Carpenter Tender; Concrete Curing Applicator; Dump Man (Batch Truck); Guardrail and Fence Installer; Joint Setter; Laborer (Construction); Landscape Laborer; Mesh Handlers & Placer; Right-of-way Laborer; Riprap Laborer & Grouter; Scaffold Erector; Seal Coating; Surface Treatment or Road Mix Laborer; Sign Installer; Slurry Seal; Utility Man; Bridge Man; Handyman; Waterproofing Laborer; Flagperson; Hazardous Waste (level D); Diver Tender; Zone Person & Traffic Control

GROUP 2 - Asphalt Raker; Concrete Puddler; Kettle Man Pipeline); Machine Driven Tools (Gas, Electric, Air); Mason Tender; Brick Paver; Mortar Mixer; Power Buggy or Power Wheelbarrow; Paint Striper; Sheeting & Shoring Man; Surface Grinder Man; Plastic Fusing Machine Operator; Pug Mill Operator; & Vacuum Devices (wet or dry); Rodding Machine Operator; Diver; Screwman or Paver; Screed Person; Water Blast, Hand Held Wand; Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (level C); Air Track and Wagon Drill; Bottom Person; Cofferdam (below 25 ft. deep); Concrete Saw Person; Cutting with Burning Torch; Form Setter; Hand Spiker (Railroad); Pipelayer; Tunnel Laborer (without air) & Caisson; Underground Person (working in Sewer and Waterline, Cleaning, Repairing & Reconditioning); Sandblaster Nozzle Person; & Hazardous Waste (level B)

GROUP 3 - Blaster; Mucker; Powder Person; Top Lander; Wrencher (Mechanical Joints & Utility Pipeline); Yarnier; Hazardous Waste (level A); Concrete Specialist; Concrete Crew in Tunnels (With Air-pressurized - \$1.00 premium); Curb Setter & Cutter; Grade Checker; Utility Pipeline Tapper; Waterline; and Caulker

GROUP 4 - Miner (With Air-pressurized - \$1.00 premium); & Gunite Nozzle Person

TUNNEL LABORER WITH AIR-PRESSURIZED ADD \$1.00 TO BASE RATE

SIGNAL PERSON WILL RECEIVE THE RATE EQUAL TO THE RATE PAID THE LABORER CLASSIFICATION FOR WHICH HE OR SHE IS SIGNALING.

PAIN006-002 05/01/2023

ASHTABULA, CUYAHOGA, GEAUGA, LAKE, LORAIN, PORTAGE (N. of the East-West Turnpike) & SUMMIT (N. of the East-West Turnpike)

	Rates	Fringes
PAINTER		
COMMERCIAL NEW WORK; REMODELING; & RENOVATIONS		
GROUP 1.....\$ 30.75		18.95
GROUP 2.....\$ 31.15		18.95

GROUP 3.....	\$ 31.45	18.95
GROUP 4.....	\$ 37.01	18.95
COMMERCIAL REPAINT		
GROUP 1.....	\$ 29.25	18.95
GROUP 2.....	\$ 29.65	18.95
GROUP 3.....	\$ 29.95	18.95

PAINTER CLASSIFICATIONS - COMMERCIAL NEW WORK; REMODELING; & RENOVATIONS

GROUP 1 - Brush; & Roller

GROUP 2 - Sandblasting & Buffing

GROUP 3 - Spray Painting; Closed Steel Above 55 feet; Bridges & Open Structural Steel; Tanks - Water Towers; Bridge Painters; Bridge Riggers; Containment Builders

GROUP 4 - Bridge Blaster

PAINTER CLASSIFICATIONS - COMMERCIAL REPAINT

GROUP 1 - Brush; & Roller

GROUP 2 - Sandblasting & Buffing

GROUP 3 - Spray Painting

PAIN007-002 07/01/2025

FULTON, HENRY, LUCAS, OTTAWA (Excluding Allen, Bay, Bono, Catawba Island, Clay Center, Curtice, Danbury, Eagle Beach, Elliston, Elmore, Erie, Fishback, Gem Beach & Genova) & WOOD

	Rates	Fringes

PAINTER

NEW COMMERCIAL WORK

GROUP 1.....	\$ 33.66	23.88
GROUP 2.....	\$ 34.66	23.88
GROUP 3.....	\$ 34.66	23.88
GROUP 4.....	\$ 34.66	23.88
GROUP 5.....	\$ 34.66	23.88
GROUP 6.....	\$ 34.66	23.88
GROUP 7.....	\$ 34.66	23.88
GROUP 8.....	\$ 34.66	23.88
GROUP 9.....	\$ 34.66	23.88

REPAINT IS 90% OF JR

PAINTER CLASSIFICATIONS

GROUP 1 - Brush; Spray & Sandblasting Pot Tender

GROUP 2 - Refineries & Refinery Tanks; Surfaces 30 ft. or over where material is applied to or labor performed on above ground level (exterior), floor level (interior)

GROUP 3 - Swing Stage & Chair

GROUP 4 - Lead Abatement

GROUP 5 - All Methods of Spray

GROUP 6 - Solvent-Based Catalized Epoxy Materials of 2 or More Component Materials, to include Solvent-Based Conversion Varnish (excluding water based)

GROUP 7 - Spray Solvent Based Material; Sand & Abrasive Blasting

GROUP 8 - Towers; Tanks; Bridges; Stacks Over 30 Feet

GROUP 9 - Epoxy Spray (excluding water based)

 PAIN0012-008 05/01/2019

BUTLER COUNTY

	Rates	Fringes
PAINTER		
GROUP 1.....	\$ 21.95	10.20
GROUP 2.....	\$ 25.30	10.20
GROUP 3.....	\$ 25.80	10.20
GROUP 4.....	\$ 26.05	10.20
GROUP 5.....	\$ 26.30	10.20

PAINTER CLASSIFICATIONS

GROUP 1: Bridge Equipment Tender; Bridge/Containment Builder

GROUP 2: Brush & Roller

GROUP 3: Spray

GROUP 4: Sandblasting; & Waterblasting

GROUP 5: Elevated Tanks; Steeplejack Work; Bridge; & Lead
 Abatement

 PAIN0012-010 05/01/2019

BROWN, CLERMONT, CLINTON, HAMILTON & WARREN

	Rates	Fringes
PAINTER		
HEAVY & HIGHWAY BRIDGES- GUARDRAILS-LIGHTPOLES- STRIPING		
Bridge Equipment Tender and Containment Builder....	\$ 21.95	10.20
Bridges when highest point of clearance is 60 feet or more; & Lead Abatement Projects.....	\$ 26.30	10.20
Brush & Roller.....	\$ 25.30	10.20
Sandblasting & Hopper Tender; Water Blasting....	\$ 26.05	10.20
Spray.....	\$ 25.80	10.20

 PAIN0093-001 12/01/2024

ATHENS, GUERNSEY, HOCKING, MONROE, MORGAN, NOBLE and
 WASHINGTON COUNTIES

	Rates	Fringes
PAINTER		
Bridges; Locks; Dams; Tension Towers; & Energized Substations.....	\$ 36.44	24.46
Power Generating Facilities..	\$ 33.29	24.46

 PAIN0249-002 05/01/2025

CLARK, DARKE, GREENE, MIAMI, MONTGOMERY & PREBLE

	Rates	Fringes
PAINTER		
GROUP 1 - Brush & Roller....	\$ 29.15	13.97
GROUP 2 - Swing, Scaffold Bridges; Structural Steel; Open Acid Tank; High		

Tension Electrical Equipment; & Hot Pipes.....\$ 33.09	13.97
GROUP 3 - Spray; Sandblast; Steamclean;	
Lead Abatement.....\$ 29.90	13.97
GROUP 4 - Steeplejack Work..\$ 30.10	13.97
GROUP 5 - Coal Tar.....\$ 30.65	13.97
GROUP 6 - Bridge Equipment Tender & or Containment Builder.....\$ 37.86	13.97
GROUP 7 - Tanks, Stacks & Towers.....\$ 33.86	13.97
GROUP 8 - Bridge Blaster, Rigger.....\$ 40.86	13.97

PAIN0356-002 09/01/2009

KNOX, LICKING, MUSKINGUM, and PERRY

	Rates	Fringes
PAINTER		
Bridge Equipment Tenders and Containment Builders....\$ 27.93		7.25
Bridges; Blasters; and Riggers.....\$ 34.60		7.25
Brush and Roller.....\$ 20.93		7.25
Sandblasting; Steam Cleaning; Waterblasting; and Hazardous Work.....\$ 25.82		7.25
Spray.....\$ 21.40		7.25
Structural Steel and Swing Stage.....\$ 25.42		7.25
Tanks; Stacks; and Towers...\$ 28.63		7.25

PAIN0438-002 12/01/2023

BELMONT, HARRISON and JEFFERSON COUNTIES

	Rates	Fringes
PAINTER		
Bridges, Locks, Dams, Tension Towers & Energized Substations.....\$ 36.09		19.49
Power Generating Facilities.\$ 32.94		19.49

PAIN0476-001 06/01/2025

COLUMBIANA, MAHONING, and TRUMBULL COUNTIES

	Rates	Fringes
PAINTER		
GROUP 1.....\$ 30.64		18.36
GROUP 2.....\$ 40.27		18.36
GROUP 3.....\$ 40.27		18.36
GROUP 4.....\$ 31.14		18.36
GROUP 5.....\$ 31.29		18.36
GROUP 6.....\$ 35.27		18.36
GROUP 7.....\$ 32.64		18.36

PAINTER CLASSIFICATIONS:

GROUP 1: Painters, Brush & Roller

GROUP 2: Bridges

GROUP 3: Structural Steel

GROUP 4: Spray, Except Bar Joist/Deck

GROUP 5: Epoxy/Mastic; Spray- Bar Joist/Deck; Working Above
50 Feet; and Swingstages

GROUP 6: Tanks; Sandblasting

GROUP 7: Towers; Stacks

PAIN0555-002 01/01/2025

ADAMS, HIGHLAND, JACKSON, PIKE & SCIOTO

	Rates	Fringes
PAINTER		
GROUP 1.....	\$ 33.32	21.54
GROUP 2.....	\$ 35.02	21.54
GROUP 3.....	\$ 36.72	21.54
GROUP 4.....	\$ 40.03	21.54

PAINTER CLASSIFICATIONS

GROUP 1 - Containment Builder

GROUP 2 - Brush; Roller; Power Tools, Under 40 feet

GROUP 3 - Sand Blasting; Spray; Steam Cleaning; Pressure Washing; Epoxy & Two Component Materials; Lead Abatement; Hazardous Waste; Toxic Materials; Bulk & Storage Tanks of 25,000 Gallon Capacity or More; Elevated Tanks

GROUP 4 - Stacks; Bridges

PAIN0639-001 05/01/2011

	Rates	Fringes
Sign Painter & Erector.....	\$ 20.61	3.50+a+b+c

FOOTNOTES: a. 7 Paid Holidays: New Year's Day; Memorial Day; July 4th; Labor Day; Thanksgiving Day; Christmas Day & 1 Floating Day

b. Vacation Pay: After 1 year's service - 5 days' paid vacation; After 2, but less than 10 years' service - 10 days' paid vacation; After 10, but less than 20 years' service - 15 days' paid vacation; After 20 years' service - 20 days' paid vacation

c. Funeral leave up to 3 days maximum paid leave for death of mother, father, brother, sister, spouse, child, mother-in-law, father-in-law, grandparent and inlaw provided employee attends funeral

PAIN0788-002 06/01/2024

ASHLAND, CRAWFORD, ERIE, HANCOCK, HURON, MARION, MORROW, OTTAWA (Allen, Bay, Bono, Catawba Island, Clay Center, Curtice, Danbury, Eagle Beach, Elliston, Elmore, Erie, Fishback, Gem Beach & Genoa), RICHLAND, SANDUSKY, SENECA & WYANDOT

	Rates	Fringes
PAINTER		
Brush & Roller.....	\$ 29.13	17.52
Structural Steel.....	\$ 30.73	17.52

WINTER REPAINT: Between December 1 to March 31 - 90%JR

\$.50 PER HOUR SHALL BE ADDED TO THE RATE OF PAY FOR THE CLASSIFICATION OF WORK:

While working swingstage, boatswain chair, needle beam and horizontal cable. While operating sprayguns, sandblasting, cobblasting and high pressure waterblasting (4000psi).

\$1.00 PER HOUR SHALL BE ADDED TO THE RATE OF PAY FOR THE CLASSIFICATION OF WORK:

For the application of catalized epoxy, including latex epoxy that is deemed hazardous, lead abatement, or for work on material where special precautions beyond normal work duties must be taken. For working on stacks, tanks, and towers over 40 feet in height.

PAIN0813-005 12/01/2008

GALLIA, LAWRENCE, MEIGS & VINTON

	Rates	Fringes
PAINTER		
Base Rate.....	\$ 24.83	10.00
Bridges, Locks, Dams & Tension Towers.....	\$ 27.83	10.00

PAIN0841-001 07/01/2025

MEDINA, PORTAGE (South of and including Ohio Turnpike), and SUMMIT (South of and including Ohio Turnpike) COUNTIES

	Rates	Fringes
Painters:		
GROUP 1.....	\$ 31.93	18.15
GROUP 2.....	\$ 32.58	18.15
GROUP 3.....	\$ 32.68	18.15
GROUP 4.....	\$ 32.78	18.15
GROUP 5.....	\$ 33.18	18.15
GROUP 6.....	\$ 38.60	18.15
GROUP 7.....	\$ 33.18	18.15

PAINTER CLASSIFICATIONS:

GROUP 1 - Brush, Roller & Paperhanger

GROUP 2 - Epoxy Application

GROUP 3 - Swing Scaffold, Bosum Chair, & Window Jack

GROUP 4 - Spray Gun Operator of Any & All Coatings

GROUP 5 - Sandblast, Painting of Standpipes, etc. from Scaffolds, Bridge Work and/or Open Structural Steel, Standpipes and/or Water Towers

GROUP 6 - Public & Commerce Transportation, Steel or Galvanized, Bridges, Tunnels & Related Support Items (concrete)

GROUP 7 - Synthetic Exterior, Drywall Finisher and/or Taper, Drywall Finisher and Follow-up Man Using Automatic Tools

PAIN0841-002 07/01/2025

CARROLL, COSHOCTON, HOLMES, STARK, TUSCARAWAS & WAYNE

	Rates	Fringes
PAINTER		
Bridges; Towers, Poles & Stacks; Sandblasting Steel; Structural Steel & Metalizing.....	\$ 33.18	18.15
Brush & Roller.....	\$ 31.93	18.15
Spray; Tank Interior & Exterior.....	\$ 32.78	18.15

PAIN1020-002 07/01/2025

ALLEN, AUGLAIZE, CHAMPAIGN, DEFIANCE, HARDIN, LOGAN, MERCER, PAULDING, PUTNAM, SHELBY, VAN WERT, and WILLIAMS COUNTIES

	Rates	Fringes
PAINTER		
Brush & Roller.....	\$ 27.59	18.54
Drywall Finishing & Taping..	\$ 28.34	18.54
Lead Abatement.....	\$ 29.34	18.54
Spray, Sandblasting Pressure Cleaning, & Refinery.....	\$ 28.34	18.54
Swing Stage, Chair, Spiders, & Cherry Pickers...	\$ 27.84	18.54
Wallcoverings.....	\$ 28.34	18.54

All surfaces 40 ft. or over where material is applied to or labor performed on, above ground level (exterior), floor level (interior) - \$.50 premium

Applying Coal Tar Products - \$1.00 premium

PAIN1275-002 05/01/2025

DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, MADISON, PICKAWAY, ROSS
& UNION

	Rates	Fringes
PAINTER		
Bridges.....	\$ 37.26	15.16
Brush; Roller.....	\$ 30.20	15.16
Sandblasting; Steamcleaning; Waterblasting (3500 PSI or Over)& Hazardous Work.....	\$ 32.35	15.16
Spray.....	\$ 32.15	15.16
Stacks; Tanks; & Towers.....	\$ 34.46	15.16
Structural Steel & Swing Stage.....	\$ 30.50	15.16

PLAS0109-001 06/01/2025

MEDINA, PORTAGE, STARK, and SUMMIT COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 33.00	23.83

PLAS0109-003 06/01/2025

CARROLL, HOLMES, TUSCARAWAS, and WAYNE COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 33.00	23.83

PLAS0132-002 07/01/2025

BROWN, BUTLER, CLERMONT, HAMILTON, HIGHLAND, WARREN COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 31.35	17.65

PLAS0404-002 05/01/2018

ASHTABULA, CUYAHOGA, GEAUGA, AND LAKE COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 29.63	17.11

PLAS0404-003 05/01/2018

LORAIN COUNTY

	Rates	Fringes
PLASTERER.....	\$ 28.86	17.11

PLAS0526-022 05/01/2018		

COLUMBIANA, MAHONING, and TRUMBULL COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 28.86	17.11

PLAS0526-023 05/01/2018		

BELMONT, HARRISON, and JEFFERSON COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 28.21	17.11

PLAS0886-001 07/01/2024		

FULTON, HANCOCK, HENRY, LUCAS, PUTNAM, and WOOD COUNTIES

	Rates	Fringes
PLASTERER.....	\$ 33.73	23.25

PLAS0886-003 07/01/2024		

DEFIANCE, ERIE, HURON, OTTAWA, PAULDING, SANDUSKY, and SENECA

	Rates	Fringes
PLASTERER.....	\$ 33.73	23.25

PLAS0886-004 07/01/2024		

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, and VAN WERT

	Rates	Fringes
PLASTERER.....	\$ 33.73	23.25

PLUM0042-002 07/01/2025		

ASHLAND, CRAWFORD, ERIE, HURON, KNOX, LORAIN, MORROW, RICHLAND
& WYANDOT

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 43.02	26.45

PLUM0050-002 06/30/2025		

DEFIANCE, FULTON, HANCOCK, HENRY, LUCAS, OTTAWA, PAULDING,
PUTNAM, SANDUSKY, SENECA, WILLIAMS & WOOD

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 51.00	32.56

PLUM0055-003 05/05/2025		

ASHTABULA, CUYAHOGA, GEAUGA, LAKE, MEDINA (N. of Rte. #18 &
Smith Road) & SUMMIT (N. of Rte. #303, including the corporate
limits of the city of Hudson)

	Rates	Fringes

PLUMBER.....	\$ 44.86	30.03

 PLUM0083-001 07/01/2023

BELMONT & MONROE (North of Rte. #78)

	Rates	Fringes
Plumber and Steamfitter.....	\$ 35.94	37.35

 PLUM0094-002 05/01/2025

CARROLL (Northen Half), STARK, and WAYNE COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 47.48	27.14

 PLUM0120-002 05/01/2025

ASHTABULA, CUYAHOGA, GEAUGA, LAKE, LORAIN (the C.E.I. Power House in Avon Lake), MEDINA (N. of Rte. #18) & SUMMIT (N. of #303)

	Rates	Fringes
PIPEFITTER.....	\$ 49.17	28.55

 PLUM0162-002 06/01/2024

CHAMPAIGN, CLARK, CLINTON, DARKE, FAYETTE, GREENE, MIAMI, MONTGOMERY & PREBLE

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 43.05	27.18

 PLUM0168-002 06/01/2025

MEIGS, MONROE (South of Rte. #78), MORGAN (South of Rte. #78) & WASHINGTON

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 40.92	37.20

 PLUM0189-002 06/01/2024

DELAWARE, FAIRFIELD, FRANKLIN, HOCKING, LICKING, MADISON, MARION, PERRY, PICKAWAY, ROSS & UNION

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 43.25	26.94

 PLUM0219-002 06/01/2025

MEDINA (Rte. #18 from eastern edge of Medina Co., west to eastern corporate limits of the city of Medina, & on the county road from the west corporate limits of Medina running due west to and through community of Risley to the western edge of Medina County - All territory south of this line), PORTAGE, and SUMMIT (S. of Rte. #303) COUNTIES

	Rates	Fringes
Plumber and Steamfitter.....	\$ 46.87	28.39

PLUM0392-002 06/01/2025

BROWN, BUTLER, CLERMONT, HAMILTON & WARREN

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 43.30	27.40

PLUM0396-001 06/01/2025

COLUMBIANA (Excluding Washington & Yellow Creek Townships & Liverpool Twp. - Secs. 35 & 36 - West of County Road #427), MAHONING and TRUMBULL COUNTIES

	Rates	Fringes
PLUMBER/PIPEFITTER.....	\$ 40.55	29.25

PLUM0495-002 06/01/2025

CARROLL (Rose, Monroe, Union, Lee, Orange, Perry & Loudon Townships), COLUMBIANA (Washington & Yellow Creek Townships & Liverpool Township, Secs. 35 & 36, West of County Rd. #427), COSHOCTON, GUERNSEY, HARRISON, HOLMES, JEFFERSON, MORGAN (South to State Rte. #78 & from McConnelsville west on State Rte. #37 to the Perry County line), MUSKINGUM, NOBLE, and TUSCARAWAS COUNTIES

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 39.32	37.60

PLUM0577-002 06/01/2025

ADAMS, ATHENS, GALLIA, HIGHLAND, JACKSON, LAWRENCE, PIKE, SCIOTO & VINTON

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 42.65	28.56

PLUM0776-002 07/01/2025

ALLEN, AUGLAIZE, HARDIN, LOGAN, MERCER, SHELBY and VAN WERT COUNTIES

	Rates	Fringes
Plumber, Pipefitter, Steamfitter.....	\$ 42.76	30.81

TEAM0377-003 05/01/2025

STATEWIDE, EXCEPT CUYAHOGA, GEauga & LAKE

	Rates	Fringes
TRUCK DRIVER		
GROUP 1.....	\$ 34.26	18.85
GROUP 2.....	\$ 35.26	18.85

TRUCK DRIVER CLASSIFICATIONS

GROUP 1 - Asphalt Distributor; Batch; 4- Wheel Service; 4-Wheel Dump; Oil Distributor & Tandem

GROUP 2 - Tractor-Trailer Combination: Fuel; Pole Trailer; Ready Mix; Semi-Tractor; & Asphalt Oil Spraybar Man When Operated From Cab; 5 Axles & Over; Belly Dump; End Dump; Articulated Dump; Heavy Duty Equipment; Low Boy; & Truck

Mechanic

TEAM0436-002 05/01/2025

CUYAHOGA, GEAUGA & LAKE

	Rates	Fringes
TRUCK DRIVER		
GROUP 1.....	\$ 34.92	19.30
GROUP 2.....	\$ 35.73	19.30

GROUP 1: Straight & Dump, Straight Fuel

GROUP 2: Semi Fuel, Semi Tractor, Euclids, Darts, Tank, Asphalt Spreaders, Low Boys, Carry-All, Tourna-Rockers, Hi-Lifts, Extra Long Trailers, Semi-Pole Trailers, Double Hook-Up Tractor Trailers including Team Track & Railroad Siding, Semi-Tractor & Tri-Axle Trailer, Tandem Tractor & Tandem Trailer, Tag Along Trailer, Expandable Trailer or Towing Requiring Road Permits, Ready-Mix (Agitator or Non-Agitator), Bulk Concrete Driver, Dry Batch Truck, Articulated End Dump

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

** Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.75) or 13658 (\$13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"