



BOARD OF COUNTY COMMISSIONERS

WARREN COUNTY, OHIO

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TOM GROSSMANN

SHANNON JONES

DAVID G. YOUNG

APPROVE NOTICE OF INTENT TO AWARD BID TO BUILDING CRAFTS, INC. FOR THE LOWER LITTLE MIAMI WWTP IMPROVEMENTS PROJECT

WHEREAS, bids were closed at 11:00 a.m., May 14, 2020, and the bids received were opened and read aloud for the Lower Little Miami WWTP Improvements Project and the results are on file in the Commissioners Office; and

WHEREAS, upon review of such bids by Chris Brausch, Warren County Sanitary Engineer, Building Crafts, Inc., has been determined to be the lowest and best bidder; and

NOW THEREFORE BE IT RESOLVED, upon recommendation of Chris Brausch, that it is the intent of this Board to award the bid to Building Crafts, Inc., 2 Rosewood Drive, Wilder, Kentucky, for a total bid price of \$2,350,000.00; and

BE IT FURTHER RESOLVED, that the Warren County Administrator is hereby authorized to execute a "Notice of Intent to Award."

Mr. Grossmann moved for adoption of the foregoing resolution being seconded by Mrs. Jones. Upon call of the roll, the following vote resulted:

Mr. Young – yea

Mrs. Jones – yea

Mr. Grossmann – yea

Resolution adopted this 26th day of May 2020.

BOARD OF COUNTY COMMISSIONERS

Laura Lander, Deputy Clerk

KH\

cc: Water/Sewer (file)
OMB Bid file

**WARREN COUNTY
WATER & SEWER DEPARTMENT**

**CHRIS G. BRAUSCH, P.E.
COUNTY SANITARY ENGINEER**

BID OPENING

May 14, 2020

LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS

Bids were closed at 11:00 a.m. this 14th day of May and the following bids were received, opened, and read aloud for the Lower Little Miami Wastewater Treatment Plant Improvements Project.

| | |
|---|-------------|
| Building Crafts, Inc. Wilder, Kentucky | \$2,350,000 |
| R.G. Zachrich Construction Inc. Defiance, Ohio | \$2,390,400 |
| Dugan & Meyers, LLC Cincinnati, Ohio | \$2,485,329 |
| Howell Contractors, Inc. Centerville, Ohio | \$2,578,000 |
| Kirk Bros Co Inc. Findlay, Ohio | \$2,603,000 |

The Water & Sewer Department will review and evaluate the bids and provide recommendations to the Warren County Board of County Commissioners at a later date.

WARREN COUNTY
WATER & SEWER DEPARTMENT

CHRIS G. BRAUSCH, P.E.
COUNTY SANITARY ENGINEER

May 11, 2020

ADDENDUM #2

**LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT
IMPROVEMENTS**

8 PAGES

This Addendum No. 2 is issued to make certain revisions, additions, and clarifications to the original Contract Documents and shall be incorporated into the original documents. This Addendum takes precedence over any and all information previously issued. No other revisions to the Contract Documents are to be inferred.

DRAWINGS

1. Sheet 18 – **Change** the first sentence in Note 2 to “LOCAL CONTROL STATION SHALL BE DESIGNED, FABRICATED, AND PROVIDED BY THE EQUIPMENT MANUFACTURER AND INSTALLED BY THE ELECTRICAL SUBCONTRACTOR.”

QUESTIONS

1. I just finished reviewing Evoqua’s scope for the clarifiers that we received this morning (attached). They need 8-10 wks for submittals, allow 4 wks for review and need 15-17 for fabrication. Potential time until equipment arrives is 31 wks (about 8 months). That will put the equipment arriving on site during a bad time on the calendar for painting the equipment after installation. Would you consider specifying factory finish painting or galvanized units to cut out this issue? **Response:** *The Owner believes there is sufficient time to complete the field painting and scope of work as required under the contract.*
2. Per Addendum #1 the electrical contractor is to provide all of the Local Control Stations. Please provide a control wiring diagram and detailed layout of each Local Control Station to properly get quoted for Screen and Clarifiers.? **Response:** *The LCS shall be designed, fabricated, and provided by the equipment manufacturer and installed by the electrical subcontractor.*
3. Refer to Sheet 2, Note 6, concerning clarifier drive replacement. It is our understanding the electrical work consists of disconnecting the existing drives and reconnecting the new drives. If this is incorrect clarify by addendum.? **Response:** *The electrical work at Clarifiers No. 3 and No. 4 is limited to disconnecting and reconnecting the power and control wiring for the clarifier drive motors.*
4. Refer to Sheet 21, Note 4, concerning Solenoid Valves. Four (4) new valves are shown on Sheet 22. Two (2) new valves are shown on Sheet 18. It is our understanding Sheet 18 is correct and a total of two (2) 1” Solenoid Valves are

required. If this is incorrect clarify by addendum.? **Response:** *Solenoid valves shall only be installed for the screenings compactors with the number of valves determined by the manufacture and shall not exceed two per compactor as shown on the drawings.*

5. Refer to Addendum #1, Drawings Item 7, Sheet 14, new Note 8, concerning the four (4) new support brackets at the concrete launders. We are unable to determine the size and length of the members and number of anchors from the picture. Bidders would require a second site visit to take field measurements to determine member and anchor sizes and lengths. Provide by addendum either the original details, the necessary field measurements or an allowance so we can include the work in our bid.? **Response:** *Construction details of the existing steel support structure are not available. Bidders may obtain this information through additional site visits.*
6. Refer to Addendum #1, Specifications Item 3, new Section 03 65 00; Addendum #1, Questions Item 15; Sheet 13 Note 7; and Sheet 15, Note 8, concerning surface preparation of existing floor grout. It is our understanding the existing surface shall be prepared in accordance with Section 03 65 00, Paragraph 1.5.A and 3.2.A. In addition the existing surface does not need to be roughened as described on Sheet 13, Note 7. If this is incorrect clarify by addendum.? **Response:** *The clarifier grout shall be installed in accordance with the directions outlined in Specification Section 03 65 00 issued under Addendum No. 1.*
7. Do you have the original submittals for the screen units? Can they be made available? **Response:** *Manufacture drawings showing the dimensions and weight of the equipment are included with this addendum.*

THIS ADDENDUM MUST BE SIGNED AND ATTACHED TO YOUR BID.

Acknowledged by:

Date



4.3. The list below shows the Bill of material of the Perforator™ Screen.

| Item | Description | Material |
|------|-------------------------|---------------|
| 1 | Side Frame | 304 SS |
| 2 | Discharge Chute | 304 SS |
| 3 | Floor Channel | 304 SS |
| 4 | Debris Plate Stiffeners | 304 SS |
| 5 | Debris Plate | 304 SS |
| 6 | Side Channel | 304 SS |
| 7 | Lifting Pad | 304 SS |
| 8 | Channel Guide | 304 SS |
| 9 | Sole Plate | 304 SS |
| 10 | Element | 304 SS |
| 11 | Seal | BUNA N |
| 12 | Brush | 304SS & NYLON |
| 13 | Chain Adjuster | 304 SS |
| 14 | Gearmotor Screen Drive | CI |
| 15 | Gearmotor Brush Drive | CI |
| 16 | Bearing | CI |
| 17 | Drive Shaft | 304 SS |
| 18 | Drive Sprocket | 304 SS |
| 19 | Chain | 304 SS |
| 20 | Lower Chain Guide | UHMW |
| 21 | Lower Chain Seal | UHMW |
| 22 | Spray Water Connection | 304 SS |
| 23 | Screen Covers | 304 SS |

4.4. The drawing following shows the positions and details of the screen components.

Only trained and authorized personnel should operate or perform maintenance of the Perforator™ screen.

WARREN COUNTY
WATER & SEWER DEPARTMENT

CHRIS G. BRAUSCH, P.E.
COUNTY SANITARY ENGINEER

May 7, 2020

ADDENDUM #1

**LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT
IMPROVEMENTS**

23 PAGES

This Addendum No. 1 is issued to make certain revisions, additions, and clarifications to the original Contract Documents and shall be incorporated into the original documents. This Addendum takes precedence over any and all information previously issued. No other revisions to the Contract Documents are to be inferred.

DRAWINGS

1. Sheet 02 – **Add** the following to Coded Note 7:
“LATERAL EXTENSIONS TO THE YARD HYDRANTS SHALL BE 4” DIP.”
2. Sheet 02 – **Replace** Coded Note 8 with the following:
“8. REMOVE EXISTING 2” NPW AND REPLACE WITH NEW 4” DIP IN SAME LOCATION FROM NEW 4” DIP TO EXISTING YARD HYDRANT. INSTALL PIPING AND REPAIR ASPHALT PER ASPHALT PAVNG DETAIL ON SHEET 30.”
3. Sheet 11 –General Note 4 **Delete** the phrase “WITH A MINIMUM YIELD STENGTH OF 36 KSI.” and **insert** the phrase “WITH A MINIMUM YIELD STRENGTH OF 30 KSI.”
4. Sheet 14 – **Add** the following note:
“GENERAL NOTE:
1. CLARIFIER NO. 1 MECHANISM SHALL ROTATE CLOCKWISE. CLARIFIER NO. 2 MECHANISM SHALL ROTATE COUNTER CLOCKWISE.”
5. Sheet 14 – **Delete** Coded Note 7 and the requirement to install a 4’ x 4’ concrete landing for the clarifier stairs.
6. Sheet 14 – **Delete** Coded Note 5 and **Replace** with the following:
“ 5. REUSE EXISTING STAIRS, SUPPORTS, AND HANDRAIL. COORDINATE WITH CLARIFIER MANUFACTURER TO SECURE STAIR HEADER TO CLARIFIER BRIDGE. GRIT BLAST AND PAINT STAIR STRINGERS AND TREADS.”
7. Sheet 14 – **Add** the following note:

BE FIELD CUT TO GIVE THE APPEARANCE OF ONE CONTINUOUS STONE. MATERIAL SHALL BE ROCKCAST BY READING ROCK, OR EQUAL.”

14. Sheet 31 – **Add** the following to Coded Note 3:

“STONE VENEER SHALL BE A LIGHTWEIGHT CONCRETE PRODUCT, DESIGNED FOR COSMETIC USE ON EXTERIOR WALLS IN COMMERCIAL APPLICATIONS. VENEER SHALL BE FOR NON-STRUCTURAL USE, REQUIRE NO ADDITIONAL FOOTING, AND BE APPLIED TO MASONRY WALLS. VENEER SHALL BE A BLEND OF PORTLAND CEMENT, LIGHTWEIGHT AGGREGATES AND IRON OXIDE PIGMENTS SHAPED IN HAND-CRAFTED MOLDS. VENEER SHALL BE MANUFACTURED BY PROVIA, LLC OR EQUAL.

SPECIFICATIONS

1. SECTION 00 10 30 – BID FORM. **Delete** the Bid Form and **Replace** with the updated Bid Form. The new bid form changes the quantity for full depth asphalt repair and changes the VLR cleaning (Items 3, 4, and 5) to allowance items with established budgets.
2. SECTION 03 41 00 – STRUCTURAL PRECAST CONCRETE. **Add** paragraph 1.2.B.2 as follows:

“2. Force Main Vacuum Relief Vent Manhole. “
3. **Add** SECTION 03 65 00 – CEMENTICIOUS CLARIFIER GROUT to the specifications.
4. **Delete** Section 26 05 34 – CABINETS, BOXES, AND FITTINGS, in its entirety and **replace** with the updated specification section.
5. **Delete** Section 26 28 16 – CIRCUIT AND MOTOR DISCONNECTS, in its entirety and **replace** with the updated specification section.

QUESTIONS

1. What is the height from grade of the Sludge Holding Tank? **Response:** *The top of wall is at EL. 753.92. The ground elevation around the tank varies between EL 734.00 and 736.00.*
2. Is the contractor responsible for disposing of the solids removed from the VLR Tanks? **Response:** *All collected and dewatered solids shall disposed in the existing 40 yard containers used by the County to haul dewatered biosolids to the landfill. Owner shall pay all hauling, tipping, and disposal fees for landfill disposal of the solids.*
3. Is there an owner designated location onsite or elsewhere the material collected from the VLRS can be dumped? **Response:** *All collected and dewatered solids can be moved to the outdoor biosolids storage pad.*
4. If solids have been removed in the past, is there any documentation or operations knowledge as to where it was disposed, and what classification the material was assigned at the place of disposal? **Response:** *The Owner will be responsible for*

the landfill disposal of the dewatered VLR material. The proposed disposal method is consistent with current and past practices.

5. Upon completion of asphalt surface sealing, is the contractor required to provide any pavement markings? **Response:** *Existing pavement has no markings and no markings are included in the scope of work.*
6. Should the 6-inch Scum Piping at Clarifiers 1 and 2 be Epoxy lined? **Response:** *No. The pipe shall be supplied as specified in Section 33 05 33 – PRESSURE PIPE AND FITTINGS, DUCTILE IRON.*
7. Refer to Sheet 2, Note 7, concerning replacement of the 2” and 4” NPW. It is our understanding that the header running east-west is 4” and the three (3) branches running north-south to the yard hydrants is 2”. If this is correct clarify by addendum. **Response:** *All new water piping, including lateral piping to the hydrants shall be 4-inch restrained ductile iron pipe.*
8. Refer to Sheet 2, Note 7, concerning replacement of the 4” NPW. The note specifies restrained joint on all fittings. It is our understanding mechanical joint fittings with wedge restrained glands and push joint pipe is acceptable. If this is incorrect clarify by addendum. **Response:** *See Section 33 05 33 – PRESSURE PIPE AND FITTINGS, DUCTILE IRON, paragraph 2.1.C.5.e, for acceptable restrained joint systems and manufacturers.*
9. Refer to Sheet 10 concerning SS Underside Baffle (Typ.) below the concrete baffle. Does the SS Underside Baffle conflict with the new VLR framing? **Response:** *The SS underside support framing does not conflict with the new VLR baffle*
10. Refer to Sheet 14, Note 7, concerning requirements to extend existing sidewalk to the landing. We cannot determine the amount of sidewalk that is required. It is our understanding two (2) 4’x4’ landings are all that is required. If sidewalk is required provide detail and amount (square foot) of sidewalk required by addendum. **Response:** *Sidewalk and concrete landing is not required for the project. See updates to Sheet 14 contained in this addendum.*
11. Looking at the VLR diffuser support detail C on sheet 11, it calls for the support channel that supports the perforated plate to be “CHAN 304 6x1.9x0.343”. I don’t find this size channel in any reference books. Can you please confirm this is the size of channel required? **Response:** *The notation shown on Sheet 11 was provided by stainless steel manufacturers and are available shapes they had in stock at the time of design (there were very few other channel shapes available).*
12. On Sheet 11 it appears that the designer is referencing a carbon structural steel yield strength requirement of 36 ksi when requiring that all shapes be 304L stainless steel (Note 2 on sheet 11). I’m no steel genius but it appears that stainless steel yield strengths don’t follow that standard (ASTM A36) and are typically around 30,000 psi (30 ksi per ASTM A276). Can B&N confirm that 304L products are actually made to the 36 ksi yield strength? **Response:** *For Type 304L, the typical yield strength is 30 ksi. This rating is applicable to this design, as the components are not loaded in a way to make them that sensitive to yielding.*
13. Spec section 33 05 33 makes reference to Spec Section 40 05 13 for flanged fittings. Spec section 40 05 13 is not in the bid documents. What are the Specifications for flanged fittings? **Response:** *There is minimal flanged piping required for this project. Any flanged piping provided for this project should be*

thickness Class 53, have an ANSI B16.1 rating of Class 125, meet all requirements of ANSI/AWWA-C115/A21.15, and be equipped with full face rubber gaskets, and stainless steel bolts.

14. The General Note on sheet 07 says that all work in the VLR is considered confined space. OSHA allows contractors to de-rate tanks with proper LOTO, PPE and monitoring. Is this acceptable? **Response:** *The Contractor needs to provide all equipment, materials, and supplies necessary for a safe working environment and to meet OSHA requirements. The Owner will not provide supplies, materials, or equipment to be used while working in the VLR tanks.*
15. Regarding the clarifier bottoms, the specified process for scarifying or preparing the floors for the new topping needs to be carefully selected so that isn't so aggressive that it causes the existing grout to break loose. I think the best method to prep the floor prior to applying bonding agent would be to use a 3,000 psi sprayer to water blast and clean the floor. Any impact will probably be a bad idea. **Response:** *This addendum includes specification SECTION 03 65 00 – CEMENTICIOUS CLARIFIER GROUT that provides further clarification on this issue.*
16. The existing wiring methods in the screen building appear to be an attempt of C1D1 wiring methods. This would typically be a C1D2 area classification within certain envelopes around the channels and equipment. The electrical drawings have the electrical contractor providing a NEMA 4X disconnect switch for this same area which cannot be installed if the area is rated. The Screen Specifications for controls denotes the use of 4X panels for the control cabinet mounted in the electrical room (which currently houses all NEMA 12 or lower equipment) and there is no specification for the Screen System Supplier provided Local Control Stations as noted on drawing 18 note 2. The area classification on the lower left corner of the dashed outline area classification on drawing 18 states area to be "Class0. Div. 1 Area" which would make it non-classified. Is the Screen Building classified and if so what rating is it? **Response:** *The Pretreatment room that contains the screen and compactor is a NFPA 820 Class 1, Division 1 hazardous environment. All equipment in this area shall be explosion proof. See changes to the drawings and specification contained in this addendum.*
17. The equipment declaration form (attached) lists Evoqua, Kusters, Walker and WesTech as manufacturers for clarifiers 1 & 2, spec section 44 32 00 (attached) lists Evoqua, Envirodyne, Kusters and Ovivo. Obviously, as a representative of WesTech we would like to have WesTech included in the spec as well as the equipment declaration. **Response:** *The equipment form to be included with the bid form (Section 00 10 40) that you referenced for Clarifiers 1 and 2 is correct, with Evoqua as base bid equipment and the other three listed as deductive alternates.*
18. Reviewing drawing 14, note 5 calls for new aluminum stairs, supports and handrail outside of the tank. I could find not standard stair details. I did not see where the stairs were include in 44 32 40 and clarifier manufacturers will exclude the items outside the tank unless forced to do otherwise. Also, the depiction of the stairs on drawing 14 are nowhere close the actual existing stairs and will deceive any bidder that isn't paying attention to the existing. The existing stairs have 15 risers with an overall length of approximately 16'. Please provide some standard details and clarify if the contractor is responsible for having a PE design the stairs. **Response:** *The stair requirement has been removed from the project. The existing stairs will be*

reused at the existing location. See updates to Sheet 14 contained in this addendum.

19. I have a question regarding the requirements for the Little Miami WWTP project that is bidding on the 14th. Is there any Domestic requirements for the ductile pipe, fittings, or valves? **Response:** *Pipe requirements are contained in Section 33 05 30 and Section 33 05 33. Requirements regarding the pipe manufacture are contained in Section 33 05 30, Paragraph 2.1.B.*
20. Will restrained joint gaskets (Field-lok / Fast Grip) be allowed for the 18" Line that is being pushed through the existing 27"? **Response:** *No. The acceptable restrained pipe material is listed on Sheet 28.*
21. Refer to Sheet 14, Note 3, concerning weir trough scum baffle; and Sheet 15, Section C, concerning fiberglass effluent launder. The note and detail for the effluent weirs and scum baffles are confusing to us. It is our understanding the launder (or trough) is existing concrete, the new weir is attached directly to the concrete launder and the new scum baffle is to attach to the concrete launder with support brackets. If this is incorrect clarify by addendum. **Response:** *Your understanding of the intended design is correct.*
22. Does the job include a brush system to clean the clarifier weirs? **Response:** *Yes. The requirement for the cleaning system is located in Section 44 32 30, Paragraph 2.2.J.*

THIS ADDENDUM MUST BE SIGNED AND ATTACHED TO YOUR BID.

Acknowledged by:

Date

**SECTION 00 10 30
BID FORM**

BIDDER agrees to perform all the work described in the Contract Documents for the following prices:

| (1) Item | (2) Description | (3) Quantity | (4) Unit | Unit Prices in Figures | | (7 = 5 + 6) Total (Sum of Labor & Material) | (8 = 3 x 7) Total Extended Informal Price in Figures |
|-------------|--|-----------------|-------------|------------------------|-----------------|--|---|
| | | | | (5) Labor | (6) Material | | |
| 1. | Wastewater Treatment Plant and Force Main Improvements, Complete | 1 | L.S. | | | | |
| 2. | Bond and Mobilization | 1 | L.S. | --- | --- | --- | |
| 3. | VLR 1 Cleaning (Contract Allowance) | 80 | C.Y. | --- | --- | --- | \$30,000 |
| 4. | VLR 2 Cleaning (Contract Allowance) | 80 | C.Y. | --- | --- | --- | \$30,000 |
| 5. | VLR 3 Cleaning (Contract Allowance) | 80 | C.Y. | --- | --- | --- | \$30,000 |
| 6. | Crack Sealing and Surface Sealing of Existing Asphalt Pavement (Approx 200,000 SF) | 1 | L.S. | | | | |
| 7. | Full Depth Pavement Restoration | 400 | S.Y. | | | | |

VLR = Vertical Loop Reactor
L.S. = Lump Sum
C.Y. = Cubic Yard
S.Y. = Square Yard

Total of Bid Items \$ _____

SECTION 03 65 00

CEMENTICIOUS CLARIFIER GROUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to furnish and install a maximum of 3-inches of cement grout on the bottom of Clarifiers No. 1 and 2. The grout shall be swept in over the existing tank bottoms using the power of the clarifier rake mechanism and in accordance with the manufacture's instructions.

1.3 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all work to furnish and install the grout in compliance with all federal, state, and local codes and regulatory agencies.
- B. **Standards.** Materials and workmanship shall be in accordance with the following standards referenced herein.
 - 1. ASTM - American Society for Testing and Materials.

1.4 SUBMITTALS

- A. **Product Data.** Submit manufacturer's technical data and installation instructions. Technical data shall show manufacturer's trade name, all independent laboratory tests, performance data, method of application, storage requirements, safety fact sheet, and handling instructions.

1.5 JOB CONDITIONS

- A. **Surface Preparation.** Clean all surfaces to be grouted of loose grout, concrete and all dirt and oil. Clean existing concrete surface using a 3,000 psi power sprayer. Thoroughly dry existing surface and apply water based acrylic bonding agent in accordance with manufacture directions.
- B. **Coordination.** Coordinate all work with other trades to prevent delays, omissions, damage, and/or interference with other work.

1.6 DELIVERY AND PLACEMENT

- A. **Delivery.** Grout shall be delivered to the site from a ready mix concrete plant and immediately placed from the mixing truck into the clarifier.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIAL

A. **Grout shall cementitious** , capable of developing a minimum compressive strength of 4,500 pounds per square inch (psi) at 28 days, when tested in 2 inch cubes in accordance with ASTM C-109. Grout shall exhibit the following properties:

| | |
|--------------------------|-------------------|
| Water/Cementitious Ratio | 0.44 to 0.50 |
| Slump: | 7 inches |
| Air Content: | 6.00 % |
| Unit Weight | 135 to 145 lb/ft3 |
| Strength Class | 4,500 psi |

| Material Type | Description | Supplier Source | ASTM | Design Quantity | Specific Gravity | Volume ft3 | |
|----------------|---------------|-------------------------------------|----------|--------------------|------------------|------------|-------|
| Cement | CEMENTTYP 1-2 | Holcim -St.Geniveive, Mo. | C150 | 752 lb | 3.15 | 3.83 | |
| Fine Aggregate | NATURAL SAND | Watson Sand & Gravel-Middletown, Oh | C33 Fine | 2711 lb | 2.67 | 16.26 | |
| Water | WATER | WATER-Well Water | C1602 | 40.0 gal | 1.00 | 5.35 | |
| Admixture | AIR1 | Euclid Chemical-Cleveland, Oh | C260 | 0.4 /cwt | - | - | |
| Admixture | ASTM TYPE A/F | Euclid Chemical-Cleveland, Oh | | 6.0 /cwt | - | - | |
| | | | | Air Content | 6.00 % | *** | 1.62 |
| | | | | Yield | 3797 lb | *** | 27.05 |

PART 3 - EXECUTION

3.1 EXAMINATION

A. **Verification.** Confirm that all dimensions, elevations, and tolerances are correct prior to placing grout. Equipment shall be free of any vibration and properly supported when operated prior to placing grout.

3.2 PREPARATION

A. **Surface Preparation.** Clean all areas to be grouted so they are free of all oils, grease, laitance, loose particles, and foreign materials. Thoroughly wet all concrete to be grouted leaving no puddles prior to grouting.

3.3 INSTALLATION

A. **Placement.** Mix and place non-shrink grout in accordance with the manufacturer's instructions. Fill all voids and spaces, trim excess grout, and finish surface to match adjoining surfaces or as directed. Maintain a surface

LLMWWTP IMPROVEMENTS

temperature of not less than 50 degrees F for 7 consecutive days after placing the grout and keep the grout wetted for 3 consecutive days after placing.

B. **Items to Be Grouted (Where Applicable)**

1. Contractor to sweep in a maximum of 3" new grout over existing floor per clarifier manufacturer's requirements and specifications. Grout shall be supplied by concrete plant.

3.4 **FIELD QUALITY CONTROL**

- C. **Areas to Be Grouted.** Observe and confirm that all surfaces to be grouted are cleaned of loose mortar and concrete and all dirt and oil.
- D. **Shrinkage Cracks.** Visually inspect grouted areas after 3 months and 1 year for evidence of shrinkage cracks. Replace any grout which shows evidence of cracks.

END OF SECTION

SECTION 26 05 34

CABINETS, BOXES, AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 33, "Raceways."
 - 4. Section 26 05 29, "Supporting Devices."
 - 5. Section 26 05 26, "Grounding."

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish and install cabinets, boxes, and fittings in accordance with the plans and as specified herein.
- B. **Types of cabinets, boxes, and fittings** specified in this section include the following:
 - 1. Outlet and device boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.
 - 4. Hinged door enclosures.
 - 5. Boxes for hazardous locations.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to furnish and install cabinets, boxes, and fittings in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. **Nationally Recognized Testing Laboratory (NRTL) Listing and Labeling.** Items provided under this section shall be listed and labeled by an NRTL. The term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
- C. **National Electrical Code (NEC) Compliance.** Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code."

- D. **National Electrical Manufacturers Association (NEMA) Compliance.**
Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

1.4 **SUBMITTALS**

- A. **General.** Furnish manufacturer's product data, test reports, and material certifications.
- B. **Shop Drawings.** For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Store cabinets, boxes, and fittings** in clean dry space. Protect products from weather, damaging fumes, construction debris, and traffic.

1.7 **SPECIAL WARRANTY**

Not used.

1.8 **DEFINITIONS**

- A. **Cabinets.** An enclosure designed either for surface or for flush mounting having a frame, or trim in which a door or doors may be mounted.
- B. **Device Box.** A box designed to house a receptacle or a switch.
- C. **Enclosure.** A box, case, cabinet, or housing for electrical wiring or components.
- D. **Hinged Door Enclosure.** An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.
- E. **Outlet Box.** A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- F. **Wiring Box.** An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

PART 2 - PRODUCTS

2.1 **OUTLET, DEVICE, AND WIRING BOXES**

- A. **Metal Outlet, Device, and Wiring Boxes**

1. Conform to UL 541A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
2. Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be flat-rolled code gauge galvanized steel with stamped knockouts, threaded screw holes, and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings, and fixture studs. Device boxes shall be minimum of 3-1/2 inches deep.
3. Provide cast aluminum boxes with threaded raceway entries, and features and accessories suitable for each location including mounting ears, threaded screw holes for devices, and closure plugs. Boxes shall be made from copper free aluminum. Device boxes shall be minimum of 2-1/2 inches deep. Outlet boxes shall be minimum of 1-1/2 inches deep.
4. Provide explosionproof boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.2 PULL AND JUNCTION BOXES

- A. **General.** Comply with UL 50, "Electrical Cabinets and Boxes," for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
- B. **General Purposes Boxes.** Hot-dip galvanized sheet steel with stamped knockouts and with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. **Dusttight and Oiltight Boxes.** Hot-dip galvanized sheet steel without knockouts and with welded seams and oil-resistant gasket. Rated NEMA 12.
- D. **Raintight Boxes.** Painted galvanized steel, drip shield, with stamped knockouts in bottom only. Rated NEMA 3R.
- E. **Weatherproof Boxes.** Type 316 stainless steel, welded seams, without knockouts. Stainless steel hardware, seamless gasket, cover clamps on all four sides. Rated NEMA 4X.
- F. **Cast Aluminum Boxes.** Molded of copper-free aluminum, with gasketed cover and integral threaded conduit entrances.
- G. **Explosionproof Boxes.** Cast metal boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.3 HINGED DOOR ENCLOSURES

- A. **General.** Comply with UL 50, "Cabinets and Enclosures," and NEMA ICS6, "Enclosures for Industrial Control and Systems."
- B. **General Purpose Enclosures.** Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and removable, with 3/4-inch flange around all edges, shaped to cover edge of boxes. Provide three-point handle-operated latch with key lock. Enclosure greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 1 and shall be painted American National Standards Institute (ANSI) 61 gray.
- C. **Dusttight and Oiltight Enclosures.** Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable, with 3/4-inch flange around all edges, shaped to cover edge of box. Oil resistant gasket. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 12 and shall be painted ANSI 61 gray unless otherwise noted.
- D. **Weatherproof Enclosures.** Constructed of 14-gauge Type 316 stainless steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable. Rolled lip around door and cabinet. Watertight seamless gasket. Stainless steel door clamps. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted, removable internal mounting panel for component installation. Enclosure shall be rated NEMA 4X.

2.4 CABINETS

- A. **General.** Comply with UL 50, "Electrical Cabinets and Boxes."
- B. **Cabinet shall be constructed of sheet steel,** NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24 inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24 inches apart and not over 6 inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.
- C. **Provide double doors for cabinets** wider than 24 inches. Telephone cabinets wider than 48 inches may have sliding or removable doors.
- D. **Provide combination spring catch** and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and

lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.5 **ENCLOSURES IN HAZARDOUS CLASSIFIED LOCATIONS**

A. **NEMA 7 Rated**

1. Copper-free aluminum, cast iron, or malleable iron alloy with manufacturers standard finish.
2. Drilled and tapped openings or tapered threaded hub.
3. Cover bolted-down with stainless steel bolts.
4. Seal gasket shall be neoprene.
5. External mounting flanges.
6. Grounding lug.
7. Suitable for use in NEC Class 1, Groups C&D.
8. Enclosures for use in hazardous areas shall be watertight, rustproof and corrosion resistant, and explosion proof with threaded conduit openings (5 2 full threads – minimum), provided with rustproof hardware, and comply with UL and CSA standards.

2.6 **ACCESSORIES**

- A. **Corrosion Inhibitors.** All enclosures containing equipment, terminals, or splices shall have a vapor phase corrosion inhibitor. Provide two spares for each one installed.

2.7 **MANUFACTURERS**

- A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
1. Adalet Enclosure Systems.
 2. American Electric.
 3. Carlon Division of Lamson & Sessions.
 4. Crouse Hinds.
 5. Erickson Electrical Equipment Co.
 6. Hoffman Enclosures.
 7. Killark Electric Mfg. Co.
 8. O.Z. Gedney.
 9. Racor/Bell Division Harvey Hubbell.
 10. Spring City Electrical Mfg. Co.
 11. Square D Co.
 12. Steel City/Thomas & Betts.

PART 3- EXECUTION

3.1 **COORDINATION**

- A. **Coordinate installation of electrical cabinets,** boxes, and fittings with wire/cable, wiring devices, and raceway installation work.

3.2 INSTALLATION

A. Uses Permitted

1. Outlet Boxes.
 - a. Use galvanized flat rolled sheet steel boxes in finished areas with framed construction
 - b. Use nonmetallic boxes in corrosive areas as designated on the plans.
 - c. Use explosionproof boxes in hazardous areas as designated on the plans.
 - d. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating suitable for each location installed.

2. Pull and Junction Boxes.
 - a. Use general purpose boxes in finished areas with framed construction.
 - b. Use dusttight and oiltight boxes in other dry interior areas.
 - c. Use explosionproof boxes in hazardous areas as designated on the plans.
 - d. Use weatherproof boxes for all other locations.
3. Hinged Door Enclosures.
 - a. Use dusttight and oiltight enclosures to house electrical equipment and controls in dry interior locations.
 - b. Use weatherproof enclosures to house electrical equipment and controls in all other locations.
4. Cabinets.
 - a. Install enclosures and associated materials and NEMA types suitable for each location and in conformance with the drawings.

B. General

1. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
2. Support and fasten items securely in accordance with Section 26 05 29, "Supporting Devices."
3. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than size indicated.
4. Remove sharp edges where they may come in contact with wiring or personnel.
5. Install boxes in locations which ensure ready accessibility to enclosed electrical wiring and avoid installing boxes back to back in walls where there would be less than 6 inches (150 millimeters [mm]) separation. Fasten boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Aluminum boxes in contact with reinforced concrete shall be isolated by a bitumastic coating.
6. Provide electrical connections for installed boxes.

C. Outlet, Device, and Wiring Boxes

1. For outlets at windows and doors, locate close to window trim. For outlets indicated above doors, refer to plans for mounting height above finished floor and center outlets above the door opening except as otherwise indicated.
2. For column and pilaster locations, locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions.
3. For outlet boxes for locations in special finish materials for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone, or wood walls, use rectangular

shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

4. Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.
5. For outlet locations on exterior face of exterior walls, all outlet boxes shall be recessed in the wall.
6. For cover plates for surface boxes, use plates sized to box front without overlap.
7. Protect outlet boxes to prevent entrance of plaster and debris.

D. Pull and Junction Boxes

1. Install clamps, grips, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 314 of NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

E. Cabinets and Hinged Door Enclosures

1. Mount with fronts straight and plumb.
2. Install with tops 78 inches above floor.
3. Set cabinets in finished spaces flush with walls.
4. Use spacers to maintain 1/4-inch clearance from wall.

3.3 GROUNDING

- A. **Electrically ground metallic cabinets**, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box, or enclosure.

3.4 CLEANING AND FINISH REPAIR

- A. **Upon completion of installation** and before devices and wiring are installed, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions, and weld marks.
- B. **For galvanized finish**, repair damage using a zinc-rich paint recommended by the manufacturer.

LLMWWTP IMPROVEMENTS

- C. **For painted finish**, repair damage using matching corrosion-inhibiting touch-up coating.

END OF SECTION

SECTION 26 28 16

CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 12, "Wires, Cables, and Connectors."
 - 4. Section 26 05 33, "Raceway."
 - 5. Section 26 05 34, "Cabinets, Boxes, and Fittings."

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and material necessary to install circuit and motor disconnects in accordance with the plans and as specified herein.
- B. **Extent of circuit and motor disconnect** switch work is indicated by drawings and schedules.
- C. **Types of circuit and motor disconnect** switches in this section include the following:
 - 1. Equipment disconnects.
 - 2. Motor circuit disconnects.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work associated with circuit and motor disconnects in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
 - 1. National Electrical Code (NEC) Compliance. Comply with NEC requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.
 - 2. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with requirements of UL 98 "Enclosed and Dead Front Switches." Provide circuit and motor disconnect switches which have been UL listed and labeled.
 - 3. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA Standards Pub. Nos. KS 1, "Enclosed and Miscellaneous Distribution Equipment Switches

(600 Volts Maximum)," and 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

1.4 **SUBMITTALS**

- A. **General.** Submit manufacturer's product data, test reports, and material certifications.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Deliver circuit and motor disconnect** switches properly packaged in factory-fabricated-type containers or wrappings which properly protect devices from damage.
- B. **Store circuit and motor disconnect** switches in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. **Handle circuit and motor disconnect** switches carefully to prevent physical damage. Do not install damaged disconnect switches; remove from site and replace damaged devices with new.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- A. **Heavy-Duty Safety Switches.** Provide surface-mounted, heavy-duty-type, sheet steel enclosed safety switches, of types, sizes, and electrical characteristics as required for the indicated installation; fused, if noted on plan. Provide switches incorporating quick make, quick break type switches, so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable and is padlockable in OFF position. Interlock enclosure door with operating handle such that the door cannot be opened with the switch closed. Provide an inconspicuous defect mechanism for use by maintenance personnel. Construct current carrying parts of high conductivity copper with silver tungsten type switch contacts; and positive pressure type reinforced fuse clips where fusible switches are specified or required by code. Provide NEMA Type 12 enclosures. For switches marked "WP," provide NEMA Type 4X stainless steel enclosures.

- B. **Hazardous Classified Locations.** Disconnects in hazard locations shall be NEMA rated suitable for use in NEC Class 1, Groups C&D and shall comply with UL and CSA standards.

2.2 **MANUFACTURERS**

- A. **Manufacturer.** Subject to compliance with requirements, provide circuit and motor disconnects of one of the following (for each type of switch):
 - 1. Crouse-Hinds Co.
 - 2. Cutler-Hammer, Inc.
 - 3. General Electric Co.
 - 4. Square D Company.

PART 3 - EXECUTION

3.1 **INSTALLATION**

- A. **Install circuit and motor disconnect** switches as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and National Electrical Contractor's Association (NECA) "Standard of Installation," and in accordance with recognized industry practices.
- B. **Coordinate circuit and motor disconnect** switch installation work with electrical raceway and cable work, as necessary for proper interface.
- C. **Locations of disconnect switches** as shown on the plans are approximate unless dimensioned. Install disconnect switches as close to the equipment served as practical, but at a readily accessible location with adequate working clearances to meet all NEC requirements.
- D. **Provide a suitable means** for mounting all disconnect switches.

3.2 **GROUNDING**

- A. **Provide equipment grounding connections**, tightened to ensure a permanent and effective ground, for all electrical disconnect switches.

3.3 **FIELD QUALITY CONTROL**

- A. **Subsequent to completion of installation** of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest. Corrective action and repeated tests shall be accomplished at own expense.

END OF SECTION

CONTRACT DOCUMENTS

**LOWER LITTLE MIAMI
WASTEWATER TREATMENT PLANT
IMPROVEMENTS PROJECT**

WARREN COUNTY WATER & SEWER
DEPARTMENT

WARREN COUNTY BOARD OF COMMISSIONERS
406 JUSTICE DRIVE
LEBANON, OHIO 45036
(513) 695-1250

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SECTION 00 10 10
INVITATION TO BIDDERS

Separate sealed bids for the Lower Little Miami Wastewater Treatment Plant Improvements Project will be received by the Warren County Board of Commissioners at the Office of the Warren County Commissioners, 406 Justice Drive, Lebanon, Ohio 45036, until 11:00 AM May 14, 2020 and then at said time publicly opened and read aloud.

Bid documents, including terms, general conditions, supplemental conditions, drawings and specifications are available online at the Warren County's Website at <https://www.co.warren.oh.us/Commissioners/Bids/Default.aspx>. Questions regarding the technical specifications should be directed to Chris Brausch at the Warren County Water and Sewer Department, (513) 695-1193.

To comply with the Amended Stay at Home Order issued by the Ohio Department of Health Director on April 2, 2020, as well as any OSHA or other regulatory requirements that may apply to preventing occupational exposure to the COVID-19 virus, no prebid meeting will occur at the project site. Potential bidders interested in viewing the project sites and facilities should contact Chris Brausch.

The project generally consists of replacing two mechanically cleaned screens and two screenings compactors; replacing two secondary clarifier drives; replacing two secondary clarifiers' internal components complete, replacing a set of vertical loop reactor turning vanes; replacing a sludge holding tank aeration blower; and corresponding electrical, control, piping, site (mainly paving and asphalt resurfacing), and appurtenance upgrades to be installed within and around new and existing facilities. Recommissioning the existing abandoned 18-inch force main from the old Foster Pump Station for use as a backup forcemain for the new Foster Pump Station is also part of the project. The estimated contract value is \$3,000,000.

A bid guaranty, as required by Ohio Revised Code, Section 153.54, shall accompany each proposal submitted, as follows:

1. A Certified check, cashier's check, or letter of credit equal to ten (10) percent of the bid. A letter of credit may only be revocable by the Owner. Upon entering into a contract with the Owner, the contractor must file a performance bond for the amount of the contract, and the bid guaranty will then be returned to the successful and unsuccessful bidders upon contract execution.

OR

2. A form of bid guaranty bond (attached) for the full amount of the bid. Such bond is retained for the successful bidder, but returned to unsuccessful bidders after the contract is executed.

Warren County reserves the right to reject any or all bids submitted, to waive any irregularities in bids, and enter into a contract with the Bidder who in Warren County's consideration offered the lowest and best bid. By order of the Board of County Commissioner, County of Warren, State of Ohio.

Tina Osborne, Clerk

**SECTION 00 10 20
BID PROPOSAL**

The undersigned declares that the only persons or parties in this Bid are as stated; that the Bid is made without any collusion with other persons, firms, or corporations; that all the Contract Documents as prepared have been carefully examined; that the undersigned is fully informed in regard to all conditions pertaining to the Work and the place where it is to be done, and from them the undersigned makes this Bid. The undersigned do hereby propose to furnish all labor, materials, tools, equipment, etc., necessary to complete the work at the Lower Little Miami Wastewater Treatment Plant and adjacent Fosters Lift Station and that the bid include all costs including, permit fees, taxes, insurance, overhead, and profit. All material and equipment must comply with the specifications and contract drawings that comprise the Contract Documents.

The premiums for all Bonds required shall be paid by the Contractor and shall be included in the Contract Price. The undersigned Bidder further agrees that the Bid Security accompanying this Bid shall become the property of the County if the Bidder fails to execute the Agreement.

If any addenda are published on Warren County’s website at <https://www.co.warren.oh.us/Commissioners/Bids/Default.aspx>, pursuant to SECTION 00 20 00, Paragraph 7, the undersigned acknowledges receipt of the following Addenda:

No. _____, dated _____, 2020

No. _____, dated _____, 2020

No. _____, dated _____, 2020

The price Bid shall include the following:

Item 1 - Wastewater Treatment Plant and Force Main Improvements, Complete. The lump sum Bid for this item shall include furnishing all materials, labor, tools, and equipment necessary to perform all general, mechanical, electrical, plumbing, demolition, excavation, dewatering, backfilling, stormwater management, paving, and site work to complete the improvements, complete and ready for operation in accordance with the Contract Documents.

The lump sum Bid for this item shall include complete installation of all equipment, including Base Bid items indicated on the Bid Equipment and Components schedule (Section 00 10 40) listed hereinafter; equipment testing; equipment start-up to date of final acceptance; and temporary facilities required during construction. The successful BIDDER will be required to furnish a breakdown of this lump sum Bid item as required for estimating purposes. Payment will be made in accordance with the General Conditions.

Item 2 – Bond and Mobilization. This Bid item shall include all necessary performance and payment bond premiums, insurance, and mobilization/demobilization to complete the work. The maximum amount of this bid item shall not exceed 2-percent of the total bid amount.

Items 3, 4, and 5 – Vertical Loop Reactor Cleaning. These unit price items shall include all necessary collection, removal, and on-site disposal of plastic, grit, and disposable-wipe type

accumulations existing in each of the four cells comprising each of the three reactors. The materials removed as part of the cleaning operations shall be substantially solids, with water content matching that of screenings removed by the existing mechanical bar screens and deposited into the roll-off screenings hoppers. The total cost for cleaning each of the vertical loop reactors shall be adjusted accordingly by change order to reflect the actual quantity removed and disposed of on-site.

Item 6 – Crack Sealing and Surface Sealing Asphalt Pavement. The lump sum bid item for this work shall include all necessary cleaning of asphalt pavement cracks and surfaces, sealing all pavement cracks 1/4” to 1” in width with hot applied rubberized crack sealer meeting ASTM D6690, and sealing of all asphalt pavement surfaces with a hot applied, refined coal tar emulsion, with aggregate, meeting ASTM D490 for RT-12 and ASTM D5727. Contractor shall visit the site to determine the amount of crack sealing and surface sealing required for the project when preparing his bid.

Item 7 – Full Depth Pavement Restoration. This unit price work shall include all necessary materials, equipment, and labor for perform full depth asphalt drive replacement as shown on the construction drawings.

The written/typed Total Bid price is for the convenience of the Owner in comparing bids. Any discrepancy between the actual sum of the line item totals and the written/typed total bid price shall be resolved in favor of the actual sum of the correct individual line item.

The undersigned hereby certifies under the penalty of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person or entity. The bid proposals shall remain in full force and effect for sixty (60) days after the date of opening bids. The full name and address of all persons and parties interested in the foregoing bids as principals are as follows:

Individual, Partnership, or Corporation

Signature of Corporate Officer, President, or Owner

Date

Notice of acceptance should be mail or delivered to the following:

COMPANY NAME: _____

CHIEF EXECUTIVE OFFICER: _____

ADDRESS: _____

PHONE NUMBER: _____

FAX NUMBER: _____

PROJECT CONTACT PERSON: _____

PHONE NUMBER: _____

E-MAIL ADDRESS: _____

FEDERAL ID #: _____

WEBSITE ADDRESS: _____

NOTE: The firm, corporate or individual name of the bidder must be signed in ink in the space provided for the signatures on the proposed blanks. In the case of a corporation, the title of the officer signing must be stated and such officer must be thereunto duly authorized and the seal of said corporation duly affixed. In the case of a partnership, the signature of at least one of the partners must follow the firm name, using the term "member of the firm." In the case of an individual, use the terms "doing business as", or "sole owner."

**SECTION 00 10 30
BID FORM**

BIDDER agrees to perform all the work described in the Contract Documents for the following prices:

| (1) Item | (2) Description | (3) Quantity | (4) Unit | <u>Unit Prices in Figures</u> | | (7 = 5 + 6) Total (Sum of Labor & Material) | (8 = 3 x 7) Total Extended Informal Price in Figures |
|-------------|---|-----------------|-------------|-------------------------------|-----------------|--|---|
| | | | | (5) Labor | (6) Material | | |
| 1. | Wastewater Treatment Plant and Force Main Improvements, Complete | 1 | L.S. | | | | |
| 2. | Bond and Mobilization | 1 | L.S. | - | - | - | |
| 3. | VLR 1 Cleaning | 80 | C.Y. | | | | |
| 4. | VLR 2 Cleaning | 80 | C.Y. | | | | |
| 5. | VLR 3 Cleaning | 80 | C.Y. | | | | |
| 6. | Crack Sealing and Surface Sealing of Existing Asphalt Pavement (Approx. 200,000 SF) | 1 | L.S. | | | | |
| 7. | Full Depth Pavement Restoration | 169 | S.F. | | | | |

VLR = Vertical Loop Reactor
L.S. = Lump Sum
C.Y. = Cubic Yard
S.F. = Square Foot

Total of Bid Items \$ _____

**SECTION 00 10 40
 BID EQUIPMENT AND COMPONENTS**

BIDDER shall indicate by placing an "X" in the "()" space below for the influent screen and compactor equipment which shall be furnished in performance of the Work. Only one "X" shall be entered for this category of equipment or component identified by product name and specification number.

For the secondary clarifiers and sludge holding tank blower, BIDDER shall include base bid manufacturer indicated in lump sum bid indicated on the Bid Form. BIDDER may enter deducts to the Bid Form sum for alternative equipment, as noted in each category below.

BIDDER shall follow these directions. Any Bid Form that is submitted not in compliance with these required identifications will be rejected by the OWNER and that Bid not considered in determining Award.

| Equipment (Specification Section) | Product Manufacturer or Supplier |
|---|---|
| Influent Screens and Compactors (44 12 05) | <input type="checkbox"/> a. Huber <input type="checkbox"/> b. Kusters |
| Secondary Clarifiers 1 and 2 (44 32 30) | Base Bid Manufacturer: Evoqua Deducts: <input type="checkbox"/> a. Kusters \$ _____ <input type="checkbox"/> b. Walker \$ _____ <input type="checkbox"/> c. WesTech \$ _____ |
| Secondary Clarifiers 3 and 4 (44 32 40) | Base Bid Manufacturer: Evoqua |
| Sludge Holding Positive Displacement Blower (44 12 05) | Base Bid Manufacturer: Kaeser Deducts: <input type="checkbox"/> a. Roots \$ _____ <input type="checkbox"/> b. Aerzen \$ _____ |
| Alternate 18" Force Main Alignment (Force Main Plan Sheets) *Contractor shall submit proposed open cut alternative plan with Bid if deduct for this item is selected. | Base Bid: Force Main Alignment as shown on Force Main Plan Sheets. Deducts: <input type="checkbox"/> a. Open cut new 18" force main from existing MH F-1 to existing 24" forcemain tie-in location. \$ _____ |

**SECTION 00 10 50
EXCEPTION SHEET**

Exceptions: Exceptions to any bid specification must be clearly stated on this sheet. This sheet must be submitted with each bid. If there are no exceptions, please indicate "none" below.

- 1) _____

- 2) _____

- 3) _____

- 4) _____

- 5) _____

- 6) _____

**SECTION 00 20 00
GENERAL INSTRUCTIONS TO BIDDERS**

1. **Receipt and Opening of Bids:** The Warren County Board of Commissioners (herein referred to as "Owner"), invites bids on the form attached hereto, all blanks of which must be appropriately filled in. Bids will be received by the Owner at the Office of the Warren County Board of Commissioners until 11:00 AM, Thursday May 14, 2020 and then at said office publicly opened and read aloud. The envelopes containing the bids must be sealed, addressed to Warren County Board of Commissioners at 406 Justice Drive, Lebanon, Ohio 45036, and shall be clearly marked as follows:

**BID OPENING
LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS
11:00 AM MAY 14, 2020**

The Owner may consider informal any bid not prepared and submitted in accordance with the provisions hereof and may waive any informalities or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered.

2. **Description of Project:** The project generally consists of replacing two mechanically cleaned screens and two screenings compactors; replacing two secondary clarifier drives; replacing two secondary clarifiers' internal components complete, replacing a set of vertical loop reactor turning vanes; replacing a sludge holding tank aeration blower; and corresponding electrical, control, piping, site (mainly paving and asphalt resurfacing), and appurtenance upgrades to be installed within and around new and existing facilities. Recommissioning the existing abandoned 18-inch force main from the old Foster Pump Station for use as a backup forcemain for the new Foster Pump Station is also part of the project.

3. **Construction Cost:** The Engineer's opinion of probable construction cost for the base bid work is \$3,000,000.

4. **Project Funding/Financing:** The contract shall be financed only through the Owner's reserved funds and does not receive financing through any State of Ohio or Federal funding.

5. **Time of Completion and Liquidated Damages:** The Bidder hereby agrees that the Contract Time shall commence on the date stipulated in the Notice to Proceed which will be issued by the Owner within 14 days of contract execution and to complete the work in accordance with the terms as stated in the Contract, and in accordance with the following schedule milestones:

Substantial completion: 365 days from Notice to Proceed.

Final completion: Site restoration work completed, and Contract Closeout shall be within 400 days from Notice to Proceed.

Any delays in substantial completion of the work that are within the control of the Contractor, their Subcontractor, or Supplier shall be subject to liquidated damages in the sum of \$200.00 for each consecutive calendar day that the project extends beyond the substantial completion

deadline. See the General Conditions and Supplemental Conditions for the definition and requirements of substantial completion.

6. **Bid Documents:** Bid documents, including terms, general conditions, supplemental conditions, drawings, addenda, and other information are available online, free of charge, at the Warren County's Website at <https://www.co.warren.oh.us/Commissioners/Bids/Default.aspx>. No planholder list will be maintained by the Owner. All Addenda will be posted on the website and shall not be mailed to bidders.

7. **Addenda and Interpretations:** No interpretation of the meaning of the plans, specifications or other pre-bid documents will be made to any bidder orally. Every request for such interpretation must be in writing to Chris Brausch at chris.brausch@co.warren.oh.us. To be given consideration all questions must be received by 4:00 pm on Friday, May 8, 2020. All such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be posted on the Warren County Commissioners website <https://www.co.warren.oh.us/Commissioners/Bids/Default.aspx>., no later than three days prior to the date fixed for the opening of bids. Failure of any bidder to monitor the website and download any such addendum or interpretations shall not relieve such bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents. Bidders shall be responsible for checking the website prior to submitting their bids.

8. **Required Forms:** Each bid must be submitted on the forms contained in the Contract Documents herein. All blank spaces for bid prices must be completed, in ink or typewritten, in both words and figures, and the foregoing certifications must be fully completed and executed when submitted. Each Bidder shall complete and submit the following forms with his/her bid:

| | |
|------------------|---|
| Section 00 10 20 | BID PROPOSAL |
| Section 00 10 30 | BID FORM |
| Section 00 10 40 | BID EQUIPMENT AND COMPONENTS |
| Section 00 10 50 | EXCEPTION SHEET |
| Section 00 30 10 | NONCOLLUSION AFFIDAVIT – FORM 1 |
| Section 00 30 20 | NONCOLLUSION AFFIDAVIT – FORM 2 |
| Section 00 30 30 | AFFIDAVIT OF NON-DELINQUENCY OF REAL AND/OR PERSONAL PROPERTY TAX |
| Section 00 30 40 | FINDINGS FOR RECOVERY AFFIDAVIT |
| Section 00 30 50 | EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS, BID CONDITIONS, NON-DISCRIMINATION, AND EQUAL EMPLOYMENT OPPORTUNITY AFFIDAVIT |
| Section 00 40 10 | BID GUARANTY AND CONTRACT BOND |
| Section 00 50 10 | EXPERIENCE STATEMENT |

9. **Modification or Withdraw of Bid:** Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a bid must be executed) and delivered to the place where bids are to be submitted at any time prior to the opening of bids.

After opening, a Bidder may withdraw their bid from consideration if the price bid was

substantially lower than the other bids, provided the bid was submitted in good faith and the reason for the price being substantially lower was a clerical mistake as opposed to a judgment mistake and was actually due to an unintentional omission of a substantial quantity of work, labor or material made directly in the compilation of the bid. Request to withdraw such bid must be made in writing and filed with the Owner within two business days after the opening of bids and prior to the acceptance thereof.

10. **Method of Award:** The Owner may reject all bids or may award the contract on the base bid or on the base bid combined with additions or deductible alternates, to the lowest and best bidder, as produces a net amount which is within the available funds.

To determine lowest and best bidder, the price of the bid will be given equal weight against the totality of the following factors: 1.) the bidder's information provided in the Section 00 50 10 Experience Statement which shall be used to judge responsibility, experience, skill, financial standing, feedback from references or prior clients—which may include Owner; 2.) the Section 00 10 30 Exception Sheet; 3.) availability.

If the total price received from the lowest and best bidder exceeds the amount of funds available to finance the contract, the Owner may:

- a. Reject all bids;
- b. Augment the funds available in an amount sufficient to enable award to the lowest and best bidder or bidders;
- c. Reduce the scope of work by eliminating certain items of work to produce a total bid which is within available funds;
- d. Reduce the scope of work by reducing the quantity of certain items of work to produce a total bid which is within available funds;
- e. Reduce the scope of work by a combination of adjustments as outlined in "c" and "d" above to produce a total bid which is within available funds.
- f. The Owner may reject all bids or may award the contract on the base bid or on the base bid combined with additions or deductible alternates as produces a net amount which is within the available funds.

The Owner may consider informal and may reject any bid not prepared and submitted in accordance with the provisions hereof. The Owner reserves the right to reject all bids, to waive any informalities or irregularities in the bids received, and to accept any bid which is deemed lowest and best.

11. **Qualification of Bidder:** The Owner may make such investigations as he/she deems necessary to determine the ability of the bidder to perform the work, and the bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligations

of the contract and to complete the work contemplated therein; conditional bids will not be accepted.

12. **Conditions of Work:** Each bidder must inform him/herself fully of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of his/her obligation to furnish all material and labor necessary to carry out the provisions of his/her contract. Insofar as possible the contractor, in carrying out the work, must employ such methods or means or will not cause any interruption of or interference with the work of any other contractor. No plea of ignorance of conditions that exist or that may hereafter exist, or of conditions or difficulties that may be encountered in the execution of the work as the result of failure to make such examination and investigation, will be accepted as an excuse for any failure or omission on the part of the Contractor to fulfill in every respect, all the requirements of the Contract, nor will the same be accepted as a basis for any claim whatsoever for extra compensation or for an extension of time.

13. **Obligation of Bidder:** Each bidder shall, and is hereby directed to inspect the entire site of the proposed work and judge for him/herself as to all the circumstances affecting the cost and progress of the work and shall assume all patent and latent risks in connection therewith. At the time of the opening of bids each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents (including all addenda). The failure or omission of any bidder to examine any form, instrument or document shall in no way relieve any bidder from any obligation in respect of his/her bid.

14. **Non-Collusion Affidavit:** The successful bidder will be required to submit non-collusion affidavit on the forms included in these Bid/Contract documents (SECTION 00 30 10 and 00 30 20). These affidavit shall be dated and executed as part of this bid.

15. **Real and/or Personal Property Tax Affidavit:** All bidders must complete the Real and/or Personal property tax affidavit (Section 00 30 30) and submit with your bid. This section should be fully completed whether or not you as a vendor/contractor own property in Warren County, Ohio.

16. **EEO Compliance:** Equal Employment Opportunity (EEO) compliance requirements and affidavit are contained in SECTION 00 30 50. Owner contracts that receive state or federal funding including, but not limited to, grants, loans, and debt forgiveness shall not be executed unless the Contractor possesses a current Certificate of Compliance issued by the State EEO Coordinator.

Every contract for or on behalf of the County for the construction, alteration, or repair of any public building or public work shall include an affidavit certifying the contractor complies with EEO requirements specified in Ohio Revised Code Section 153.59.

17. **Bid Security:**

A bid guaranty, as required by Ohio Revised Code, Section 153.54, shall accompany each proposal submitted, as follows:

1. A Certified check, cashier's check, or letter of credit equal to ten (10) percent of

the bid. A letter of credit may only be revocable by the Owner. Upon entering into a contract with the Owner, the contractor must file a performance bond for the amount of the contract, and the bid guaranty will then be returned to the successful and unsuccessful bidders upon contract execution.

OR

2. A form of bid guaranty and contract bond (attached) for the full amount of the bid. Such bond is retained for the successful bidder, but returned to unsuccessful bidders after the contract is executed.

Such cash, checks or bid bonds will be returned to bidders after the Owner has awarded the bid and has executed the contract, or, if no award has been made within 60 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as he/she has not been notified of the acceptance of his/her bid.

Attorneys-in-fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

18. **Liquidated Damages for Failure to Enter into Contract:** The successful bidder, upon his/her failure or refusal to execute and deliver the contract and bonds required within 10 working days after he/she has received the documents, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the bid security.

19. **Security for Faithful Performance:** Simultaneously with his/her delivery of the executed contract, the Contractor shall furnish a performance (surety) bond as security for faithful performance of this contract and for the payment of all persons performing labor on the project under the contract and furnishing materials in connection with the contract. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner. Please note that upon execution of the Contract if a Bid Guaranty/Contract Bond was submitted with your original bid a Performance Bond will not be required.

20. **Required Insurance:** In accordance with the specifications and the Supplemental Conditions, the Contractor, without restricting the obligations and liabilities assumed under the Contract Documents, shall at his own cost and expense purchase and maintaining in force until final acceptance of his work, the forms of insurance coverage as described in Section 00 80 10 Supplemental Conditions 1.2, C. Article 5 – Bonds and Insurance

Certificates from the insurance carrier stating the limits of liability and expiration date shall be filed with the Owner before operations are begun. Such certificates shall not merely name the types of policy provided, but shall specifically refer to this Contract and shall name the Board of Warren County Commissioners as additionally insured.

All policies as hereinafter required shall be so written that the Owner will be notified of cancellation or restrictive amendment at least sixty days prior to the effective date of such cancellation or amendment.

If any part of the work is sublet, insurance of the same types and limits as required shall be provided by or on behalf of the Subcontractors to cover that part of the work they have contracted to perform including Property Damage Liability Special Hazards coverage if so

required by this contract.

21. **Additional Obligations Upon Contract Award:** Upon award of the bid but prior to execution of the final agreement and notice to proceed, the Contractor shall submit all of the following documents, completed as required:

- 1) Contract
- 2) Performance Bond
- 3) Certificates of Insurance

22. **Wage Rates:** In the event that the rate of wages paid for any trade or occupant in the locality where such work is being performed are under current collective agreements or understandings between bona fide organizations of labor and employer, then the wages to be paid shall be not less than such agreed wage rates, nor less than the minimum rates compiled by the Federal Labor Standard Act. Copies of these prevailing wage rates have been included in these specifications. Every Contractor and Subcontractor who is subject to Ohio Revised Code, Chapter 4115 shall, as soon as he begins performance under his contract with the Owner, supply the Prevailing Wage Coordinator for the Owner a schedule of the dates on which he is required to pay wages to employees. He shall also deliver to the Prevailing Wage Coordinator within three weeks after each pay date, a certified copy of his payroll which shall exhibit for each employee paid any wages, name, current address, social security number, number of hours worked each day of the pay period and the total for each week, hourly rate of pay, job classification, fringe payments, and deductions from wages. The certification of each payroll shall be executed by the Contractor, Subcontractor, or duly appointed agent thereof and shall recite that the payroll is correct and complete and that the wage rate shown is not less than those required by the contract.

In case the Owner orders the Contractor to perform extra or additional work which may make it necessary for the Contractor or any Subcontractor under this contract to employ a person not herein specified, the Contractor will include in the contract change order for such extra or additional work, a minimum wage rate for such trade or occupation, and insofar as such extra or additional work is concerned, there shall be paid to each employee engaged in work of such trade or occupation, not less than the wage so included. Insofar as possible, local labor shall be employed on this work.

23. **Laws and Regulations:** The bidder's attention is directed to the fact that all applicable State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the contract the same as though herein written out in full.

24. **Foreign Corporation and Contractors:** "Foreign Corporation" means a corporation incorporated under the laws of another state. No contract shall be entered into with a foreign corporation until the Secretary of State has certified that such corporation is authorized to do business in Ohio: and until, if the bidder so awarded the Contract is a person or partnership, it has filed with the Secretary of State a Power of Attorney designating the Secretary of State as its agent for the purpose of accepting service of summons in any action brought under Ohio Revised Code, Section 153.05 or under Sections 4123.01 to 4123.94, inclusive.

25. **Safety Standards and Accident Prevention:** With respect to all work performed under this contract, the Contractor shall:

- a. Comply with the safety standards provisions of applicable laws, building and construction codes and the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act of 1970 (Public Law 91-596), and the requirements of title 29 of the code of Federal Regulations, Section 1518 as published in the "Federal Register", Volume 36, N. 75, Saturday, April 17, 1971.
- b. Exercise every precaution at all times for the prevention of accidents and the protection of persons (including employees) and property.
- c. Maintain at his/her office or other well known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or doctor's care of persons (including employees) who may be injured at the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor's care.

26. **Permits:** Contractor shall keep a copy of all permits at the project site throughout the duration of the work. The permits required for the work, the permit holder, and the entity paying for the permit is outlined below. All obtained permits acquired to date are included in SECTION 00 70 20.

| Permit | Agency | Permit Holder | Entity Paying for Permit |
|-----------------------------|----------|---------------|--------------------------|
| Permit to Install | Ohio EPA | Owner | Owner |
| Stormwater Notice of Intent | Ohio EPA | Contractor | No Cost |

27. **Subcontracts:** Contractor shall provide upon request of the Owner a list of all subcontractors intended to be used in performance of the work. In the event the Owner does not object, Contractor may have such work performed by a subcontractor. Contractor shall bind every subcontractor to, and every subcontractor must agree to be bound by the terms of the Agreement, as far as applicable to the subcontractor's work particularly pertaining to Prevailing Wages and EEO requirements. Nothing contained in the Agreement shall create any contractual relationship between any subcontractor and Owner, nor create any obligations on the part of the Owner to pay or see to the payment of any sums to any subcontractor.

28. **Subletting of Contract:** The Contractor shall not sublet, sell, transfer or assign any portion of the contract without written consent of the Owner of his designated agent. When such consent is given, the Contractor will be permitted to sublet a portion thereof, but shall perform with his own organization, work amounting to no less than fifty percent of the total contract cost, except that any time designated in the contract before computing the amount of work required to

be performed by the Contractor with his own organization, no subcontract, or transfer of contract, shall in any way release the Contractor of his liability under the contract and bonds.

29. CONFIDENTIAL DOCUMENTS & INFORMATION: Do not submit confidential documents or documents of any type that contain trade secrets. All materials submitted become public records once opened and may be copied upon request to anybody including competitive bidders.

END OF SECTION

**SECTION 00 30 10
NONCOLLUSION AFFIDAVIT – FORM 1**

State of _____

BID Identification _____

CONTRACTOR _____, being first duly sworn, deposes and says that he is _____ (sole owner, a partner, president, secretary, etc.) of _____, the party making the foregoing BID; that such BID is not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that such BID is genuine and not collusive or sham; that said BIDDER has not directly or indirectly colluded, conspired, connived or agreed with any BIDDER or any one else to put in a sham BID, or that any one shall refrain from Bidding; that said BIDDER has not in any manner, directly or indirectly, sought by agreement, communication or conference with any one to fix the BID price of said BIDDER or of any other BIDDER, or to fix any overhead, profit, or cost element of such BID price, or of that of any other BIDDER, or to secure any advantage against the OWNER awarding the contract or anyone interested in the proposed contract; that all statement contained in such BID are true; and, further, that said BIDDER has not, directly or indirectly, submitted his BID price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid and will not pay any fee in connection therewith, to any corporation, partnership, company, association, organization, BID depository, or to any member or agent thereof, or to any other individual except to such person or persons who have a partnership or other financial interest with said BIDDER in his general business.

Signed:

Subscribed and sworn to before

me this ___ day of _____, 2020.

Seal of Notary

**SECTION 00 30 20
NONCOLLUSION AFFIDAVIT – FORM 2**

STATE OF _____
COUNTY OF _____

I, _____, holding the title and position of _____ at the firm _____, affirm that I am authorized to speak on behalf of the company, board directors and owners in setting the price on the contract, bid or proposal. I understand that any misstatements in the following information will be treated as fraudulent concealment of true facts on the submission of the contract, bid or proposal.

I hereby swear and depose that the following statements are true and factual to the best of my knowledge:

The contract, bid or proposal is genuine and not made on the behalf of any other person, company or client, INCLUDING ANY MEMBER OF THE WARREN COUNTY BOARD OF COMMISSIONERS.

The price of the contract, bid or proposal was determined independent of outside consultation and was not influenced by other companies, clients or contractors, INCLUDING ANY MEMBER OF THE WARREN COUNTY BOARD OF COMMISSIONERS.

No companies, clients or contractors, INCLUDING ANY MEMBER OF THE WARREN COUNTY BOARD OF COMMISSIONERS have been solicited to propose a fake contract, bid or proposal for comparative purposes.

No companies, clients or contractors, INCLUDING ANY MEMBER OF THE WARREN COUNTY BOARD OF COMMISSIONERS have been solicited to refrain from bidding or to submit any form of noncompetitive bidding.

Relative to sealed bids, the price of the bid or proposal has not been disclosed to any client, company or contractor, INCLUDING ANY MEMBER OF THE WARREN COUNTY BOARD OF COMMISSIONERS, and will not be disclosed until the formal bid/proposal opening date.

AFFIANT

Subscribed and sworn to before me this _____ day of _____ 2020.

(Notary Public),

_____ County.

My commission expires _____ 20__

SECTION 00 30 30
AFFIDAVIT OF NON-DELINQUENCY OF REAL AND/OR
PERSONAL PROPERTY TAX

THIS SECTION SHOULD BE FULLY COMPLETED WHETHER OR NOT YOU AS A VENDOR/CONTRACTOR OWN PROPERTY IN WARREN COUNTY, OHIO. MAKING A FALSE STATEMENT ON THIS AFFIDAVIT MAY BE PUNISHABLE BY A FINE AND/OR IMPRISONMENT.

STATE OF _____)

SS:

COUNTY OF _____)

_____ being duly cautioned and sworn, states as follows:

1. That he/she is _____ of
(Title)

(Name of Contracting Party)

2. That _____ is not presently charged with any
(Name of Contracting Party)
delinquent Real and/or Personal property taxes on the general tax list of Real and/or Personal property of Warren County.

-OR-

1. That _____ is charged with delinquent Real and/or
(Name of Contracting Party)

Personal property tax on the general tax list of Real and/or Personal property of Warren County. The amount of delinquent Real and/or Personal property tax due and unpaid including any due and unpaid penalty and interest is:

\$ _____

Further, affiant states not.

Affiant

Sworn to and subscribed in my presence this ____ day of _____ 2020.

Notary Public

This instrument was prepared by _____.

Note to Fiscal Office: If any Real and/or Personal property taxes are delinquent, you must send a copy of this statement to the County Treasurer within 30 days of the date it is submitted.

**SECTION 00 30 40
FINDINGS FOR RECOVERY AFFIDAVIT**

STATE OF _____

COUNTY OF _____, SS:

_____, upon being duly cautioned and sworn, hereby states the following based on personal knowledge:

- 1) That he/she is _____ (title), of _____ (name of bidder) and authorized to execute this affidavit; and,
- 2) That _____ (name of bidder) is not a person or entity against whom a finding for recovery has been issued by the Auditor of State, which finding for recovery is unresolved as defined in Ohio Revised Code [General Provisions] Section 9.24 (B); and,
- 3) That _____ (name of bidder) does not appear in the database of unresolved findings of recovery maintained by the Auditor of State pursuant to Ohio Revised Code [General Provisions] Section 9.24 (D).

Affiant

Sworn to and subscribed in my presence this _____ day of _____, 2020.

Notary Public

My Commission expires: _____

SECTION 00 30 50

EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS, BID CONDITIONS, NON-DISCRIMINATION, AND EQUAL EMPLOYMENT OPPORTUNITY AFFIDAVIT

Bidders shall submit a copy of a valid Certificate of Compliance issued by the State EEO Coordinator for Owner projects that receive state or federal funding. The source of financing and funding for this project is specified in SECTION 00 20 00 – INSTRUCTIONS TO BIDDERS. Bidders may contact the State of Ohio, Department of Administrative Services, Equal Opportunity Division for information on how to apply online for a certification using the Ohio Business Gateway.

Every contract for or on behalf of the County for the construction, alteration, or repair of any public building or public work shall include an affidavit certifying the contractor complies with EEO requirements specified in Ohio Revised Code Section 153.59. In addition to the affidavit, all bidders agree to the following State of Ohio standard conditions of contract for construction:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex. Such action shall include, but is not limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor will in all solicitations or advertisements for employees placed by or on behalf of the prime contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex..
3. The contractor agrees to fully cooperate with the County, the State Equal Employment Opportunity Coordinator and with any other official or agency, or the State or Federal government which seeks to eliminate unlawful employment discrimination, and with all other State and Federal efforts to assure equal employment practices under its contract and the contractor shall comply promptly with all requests and directions from the County, the State Equal Opportunity Coordinator and any of the State of Ohio officials and agencies in this regard, both before and during construction.
4. Full cooperation as expressed in clause (3), above, shall include, but not be limited to, being a witness and permitting employees to be witnesses and complainants in any proceedings involving questions of unlawful employment practices, furnishing all information requested by the County and the State Equal Employment Opportunity Coordinator, and permitting access to its books, records, and accounts by the County and the State Equal Employment

Opportunity Coordinator for purposes of investigation to ascertain compliance with applicable rules, regulations and orders.

5. In the event of the contractor's noncompliance with the nondiscrimination clauses of its contract or with any of the said rules, regulations, or orders, its contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further County construction contracts.

In the event that is contract is terminated for a material breach of EEO requirements, the contractor shall become liable for any and all damages which shall accrue to the County as a result of said breach.

6. The contractor will require the inclusion of language reflecting these same six covenants within every subcontract or purchase order it executes in the performance of its contract unless exempted by rules, regulations or orders of the State Equal Employment Opportunity Coordinator so that these provisions will be binding upon each subcontractor or vendor. The contractor will take such as the County may direct as a means of enforcing such provisions, including sanctions for noncompliance; provided, however, that in any litigation with a subcontractor, vendor or other party as a result of such direction by the County, the contractor may be requested to protect the interests of the County.

The bidder hereby adopts the foregoing covenants?

_____ Yes _____ No

PLEASE NOTE: The bidder's failure to adopt the Bidder's EEO Covenants, will cause the bidder's proposal to be rejected as being non-responsive.

CERTIFICATE OF COMPLIANCE NON-DISCRIMINATION AND EQUAL EMPLOYMENT
OPPORTUNITY AFFIDAVIT (CONTRACTOR)

STATE OF _____)

SS:

COUNTY OF _____)

_____ being first duly sworn, deposes and

says that he/she is _____ of _____

the party who made the foregoing proposal; that such party as bidder does not and shall not discriminate against any employee or applicant for employment because of race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex. If awarded the bid and contract under this proposal, said party shall take affirmative action to insure that applicants are employed and that employees are treated, during employment, without regard to their race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex.. If successful as the lowest and best bidder under the foregoing proposal, this party shall post non-discrimination notices in conspicuous places available to employees and applicants for employment setting forth the provisions of this affidavit.

Furthermore, said party agrees to abide by the assurances found in Section 153.54 of the Ohio Revised Code in the Contract Provisions with the Owner if selected as the successful bidder by the Owner.

Signature

Affiant

Company/Corporation

Address

City/State/Zip Code

Sworn to and subscribed before me this _____ day of _____, 2020.

(seal)

Notary

CERTIFICATE OF COMPLIANCE NON-DISCRIMINATION AND EQUAL EMPLOYMENT
OPPORTUNITY AFFIDAVIT (SUB CONTRACTOR)

STATE OF _____)

SS:

COUNTY OF _____)

_____ being first duly sworn, deposes and

says that he _____ of _____

the party who made the foregoing proposal; that such party as bidder does not and shall not discriminate against any employee or applicant for employment because of race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex. If awarded the bid and contract under this proposal, said party shall take affirmative action to insure that applicants are employed and that employees are treated, during employment, without regard to their race, color, religion, national origin, age, disability, Vietnam era Veteran status, ancestry or sex. If successful as the lowest and best bidder under the foregoing proposal, this party shall post non-discrimination notices in conspicuous places available to employees and applicants for employment setting forth the provisions of this affidavit.

Furthermore, said party agrees to abide by the assurances found in Section 153.54 of the Ohio Revised Code in the Contract Provisions with the Owner if selected as the successful bidder by the Owner.

Signature

Affiant

Company/Corporation

Address

City/State/Zip Code

Sworn to and subscribed before me this _____ day of _____, 2020.

(seal)

Notary

SECTION 00 40 00
BONDING REQUIREMENTS

Bid guaranty, as required by Ohio Revised Code, Section 153.54, shall accompany each proposal submitted, as follows, either:

1. A Certified check, cashier's check, or letter of credit equal to ten (10) percent of the bid. A letter of credit may only be revocable by the Owner.

OR

2. A form of bid guaranty and contract bond (attached) for the full amount of the bid. Such bond is retained for the successful bidder, but returned to unsuccessful bidders after the contract is executed.

Performance bond is required upon entering into a contract with the Owner for 100 percent of the contract price when the bid guaranty is a certified check, cashier's check, or letter of credit equal to ten percent. Otherwise the bid guaranty and contract bond shall secure the performance of the contract with a penal sum of 100% of the bid. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.

**SECTION 00 40 10
BID GUARANTY AND CONTRACT BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,

(Insert full name or legal title of Contractor and Address)

as Principal and

(Insert full name or legal title of Surety)

as Surety, are hereby held and firmly bound unto the Warren County Board of Commissioners hereinafter called the Obligee, in the penal sum of the dollar amount of the bid submitted by the Principal to the Obligee on _____ to undertake the project known as:

LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS PROJECT

The penal sum referred to herein shall be the dollar amount of the Principal's bid to the Obligee, incorporating any additive or deductive alternate proposals made by the Principal on the date referred to above to the Obligee, which are accepted by the Obligee, In no case shall the penal sum exceed the amount of _____ DOLLARS, \$ _____. If this item is left blank, the penal sum will be the full amount of the Principal's bid, including alternates. Alternatively, if completed, the amount stated must not be less than the full amount of the bid, including alternates in dollars and cents. A percentage is not acceptable.

For the payment of the penal sum well and truly to be made we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal has submitted a bid on the above referred to project;

NOW, THEREFORE, if the Obligee accepts the bid of the Principal and the Principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the Principal pays to the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid and such larger amount for which the Obligee may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the Obligee does not award the contract to the next lowest bidder and resubmits the project for bidding, the Principal will pay the Obligee the difference not to exceed ten percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract documents, required advertising, and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect.

If the Obligee accepts the bid of the Principal and within TEN days after the awarding of the contract, enters into a proper contract in accordance with the bid, plans, details, specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein; and

IF THE SAID PRINCIPAL SHALL well and faithfully perform each and every condition of such contract; and indemnify the Obligee against all damage suffered by failure to perform such contract according to the provisions thereof and in accordance with the plans, details, specifications, and bills of material therefore; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract: we agreeing and assenting that this undertaking shall be for benefit of any materialman or laborer having a just claim, as well as for the Obligee herein; THEN THIS OBLIGATION SHALL be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

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

SIGNED AND SEALED this _____ day of _____ 2020.

PRINCIPAL

SURETY

By: _____

By: _____
Attorney-in-fact

Title: _____

Surety Agent's Name and Address:

**SECTION 00 40 20
PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereinafter called
(Corporation, Partnership or Individual)

Principal, and _____

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

WARREN COUNTY OHIO, BOARD OF COMMISSIONERS
406 Justice Drive
Lebanon, OH 45036

hereinafter called OWNER, in the penal sum of _____ Dollars, \$(_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 2020, a copy of which is hereto attached and made a part hereof for the construction of:

LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS PROJECT

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the guaranty period(s), and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition of the terms of the contract or the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in

any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in counterparts, each one of which shall be deemed an original, this the _____ day of _____ 2020.

ATTEST: _____
(Principal)

(SEAL) By _____

ATTEST: _____

(SEAL) _____
(Surety)

IMPORTANT: Pursuant to Ohio Revised Code §122.87(A) defines surety company as, “. . . a company that is authorized by the department of insurance to issue bonds as a surety”.

**SECTION 0050 10
EXPERIENCE STATEMENT**

The Bidder is required to state in detail in the space provided below, what work they have completed of a character similar to that included in the proposed contract, to give references and such other detailed information as will enable the Owner to judge their responsibility, experience, skill and financial standing. Completion of this statement is required and must be submitted with the Bid in order to qualify for consideration for award of contract.

SUBMITTED FOR:

LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS PROJECT

SUBMITTED BY:

Name: _____

(Print or Type Name of Bidder)
(A Corporation/A Partnership/An Individual)
[Bidder to strike out inapplicable terms.]

Address: _____

The undersigned certifies under oath the truth and correctness of all statements and of all answers to questions made hereinafter.

(Note: Attach Separate Sheets as Required)

1.0 How many years has your organization been in business as a construction contractor?

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

3.0 Has any construction contracts to which you have been a party been terminated by the owner; have you ever terminated work on a construction project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with a contract for which they furnished a bond on your behalf? If the answer to any portion of this question is "yes", please furnish details of all such occurrences including name, address, phone number, and contact person of owner, engineer, and surety, and name and date of project.

No _____ Yes _____, If yes, attach details described above.

4.0 Has any officer or partner of your organization ever been an officer or partner of another organization that had construction contracts terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond? If the answer to any portion of this question is "yes", please furnish details of all such occurrences including name, address, phone number, and contact person of owner, engineer, and surety, and name and date of project.

No _____ Yes _____, If yes, attach details described above.

5.0 Provide a list of water and wastewater construction projects, their owners, contract amounts, percent complete, short description of work, and scheduled completion that your organization has in process on this date.

6.0 Provide a list of water and wastewater construction projects, their owners, contract amounts, short description of work, and dates of completion that your organization has completed in the past five years.

7.0 Have you personally inspected the site of the proposed work? Describe any anticipated problems with the site and your proposed solutions.

8.0 List name, address and telephone number of a reference for each project listed under Items 5.0 and 6.0, above.

9.0 List name and experience of the principal individuals of your organization.

10.0 List the states in which your organization is legally qualified to do business.

11.0 List name, address and telephone number of an individual who represents each of the following and whom OWNER may contact for a financial reference:

11.1 A surety:

Name _____

Contact _____

Address _____

_____ Phone No. _____

Financial Reference _____

11.2 A bank:

Name _____

Contact _____

Address _____

_____ Phone No. _____

Financial Reference _____

11.3 A major material supplier:

Name _____

Contact _____

Address _____

Phone No. _____

Financial Reference _____

12.0 Dated at _____ this ___ day of _____, 2020.

(Print or Type Name of Bidder)

By: _____

(Seal, if corporation)

------(Affidavit for Individual)-----

_____, being duly sworn, deposes and says that all of the foregoing qualification information is true, complete, and accurate.

------(Affidavit for Partnership)-----

_____, being duly sworn, deposes and says that he/she is a member of the partnership of _____ and that all of the foregoing qualification information is true, complete, and accurate.

------(Affidavit for Corporation)-----

_____, being duly sworn, deposes and says that he/she is _____ of _____, and that all of the (Full name of Corporation)

foregoing qualification information is true, complete, and accurate.

------(Affidavit for Joint Venture)-----

_____ and _____, being duly sworn, deposes and says that they are members of _____ (Full Name of Joint Venture)

, and that all of the foregoing qualification information is true, complete, and accurate.

------(Acknowledgment) -----

_____, being duly sworn, deposes and says that he/she is
of _____; that he/she is duly authorized to make the foregoing

(Name of Bidder)

affidavit and that he/she makes it on behalf of () himself/herself; () said partnership; ()
said corporation.

Sworn to before me this _____ day of _____, 2020, in the County
of _____, State of _____.

(Notary Public)

My commission expires _____

(Seal)

**SECTION 00 60 10
CONTRACT**

THIS AGREEMENT, made this _____ day of _____, 2020, with the Warren County Board of Commissioners, 406 Justice Drive, Lebanon, Ohio, hereinafter called "Owner" and **CONTRACTOR NAME AND ADDRESS HERE** doing businesses as (an individual, partner, a corporation) hereinafter called "Contractor."

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Owner, the Contractor hereby agrees with the Owner to commence and complete the construction described as follows:

LOWER LITTLE MIAMI WASTEWATER TREATMENT PLANT IMPROVEMENTS PROJECT

hereinafter called the project, for the sum of **\$AMOUNT AND WRITE IT OUT HERE**, and all work in connection therewith, under the terms as stated in the General Conditions and Supplemental Conditions of the Contract; and as his (its or their) own proper cost and expense furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor insurance, and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in Contract Documents. "Contract Documents" means and includes the following:

- Addendum
- Division 00 – Contract Requirements
- Division 01 to 48 – Technical Specifications
- General Conditions
- Supplemental Conditions
- Any and All Bid Documents
- Construction Drawings

CONTRACTOR hereby agrees to commence work under this contract on or before a date to be specified in a Written "Notice to Proceed" of the OWNER and shall complete all work within the following requirements:

Substantial completion: 365 days from Notice to Proceed.

Final completion: Site restoration work completed, and Contract Closeout shall be within 400 days from Notice to Proceed.

Any delays in substantial completion of the work that are within the control of the Contractor, their Subcontractor, or Supplier shall be subject to liquidated damages in the sum of \$200.00 for each consecutive calendar day that the project extends beyond the substantial completion deadline.

This Agreement may be terminated by either party upon written notice in the event of substantial failure by the other party to perform in accordance with the terms of this Agreement. The nonperforming party shall have fifteen calendar days from the date of the termination notice to cure or to submit a plan for cure acceptable to the other party.

OWNER may terminate or suspend performance of this Agreement for OWNER'S convenience upon written notice to the CONTRACTOR. CONTRACTOR shall terminate or suspend performance of the services/work on a schedule acceptable to the OWNER.

The CONTRACTOR will indemnify and save the OWNER, their officers and employees, harmless from loss, expenses, costs, reasonable attorneys fees, litigation expenses, suits at law or in equity, causes of action, actions, damages, and obligations arising from (a) negligent, reckless or willful and wanton acts, errors or omissions by CONTRACTOR, its agents, employees, licensees, consultants, or subconsultants; (b) the failure of the CONTRACTOR, its agents, employees, licensees, consultants or subconsultants to observe the applicable standard of care in providing services pursuant to this agreement; (c) the intentional misconduct of the CONTRACTOR, its agents, employees, licensees, consultants, or subconsultants that result in injury to persons or damage to property. for which the OWNER may be held legally liable.

The CONTRACTOR does hereby agree to indemnify and hold the OWNER harmless for any and all sums for which the OWNER may be required to pay or for which the OWNER may be held responsible for failure of the CONTRACTOR or any subcontractors to pay the prevailing wage upon this project.

The OWNER agrees to pay the CONTRACTOR in the manner and at such times as set forth in the General Conditions and as amended in the Supplemental Conditions and in such amounts as required by the Contract Documents.

This Contract shall be construed under the laws of the State of Ohio, and the parties hereby stipulate to the venue for any and all claims, disputes, interpretations, litigation of any kind arising out of this Contract being exclusively in the Warren County, Ohio Court of Common Pleas (unless both parties mutually agree in writing to alternate dispute resolution), as well as waiving any right to bring or remove such matters in or to any other state or federal court.

This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

Contractor shall bind every subcontractor to, and every subcontractor must agree to be bound by the terms of, this Agreement, as far as applicable to the subcontractor's work particularly pertaining to Prevailing Wages and EEO requirements. Nothing contained in this Agreement shall create any contractual relationship between any subcontractor and Owner, nor create any obligations on the part of the Owner to pay or see to the payment of any sums to any subcontractor.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in two counterparts, each of which shall be deemed an original on the date first above written.

WARREN COUNTY BOARD OF COMMISSIONERS
(Owner)

David G. Young, President

ATTEST:

Tom Grossmann, Vice President

Name

Shannon Jones

(Seal)

ATTEST:

CONTRACTOR NAME HERE
(Contractor)

By: _____
Name

Title

Approved as to Form:

Assistant Prosecutor

SECTION 00 70 10
WAGE RATE DETERMINATION

Prevailing wage rates for the State of Ohio apply to this project. Contractors and Subcontractor(s) shall conform to the State of Ohio Department of Labor requirements, guidelines, and laws. Included in this section is a list of the Ohio Prevailing Wage Rates available at the time of publication. It is the responsibility of the Contractor and Subcontractor(s) to verify the wage rates prior to bidding and throughout the project. A complete list of Ohio Prevailing Wage Rates is available at the Ohio Wage and Hour website or from the Ohio Department of Commerce Wage and Hour Bureau.



Mike DeWine
Governor

Sheryl Maxfield
Director

PREVAILING WAGE GUIDE

WARREN COUNTY

OHIO DEPARTMENT OF COMMERCE

Division of Industrial Compliance
Bureau of Wage and Hour Administration
6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
Phone: 614-644-2239
Fax: 614-728-8639
www.com.ohio.gov
TTY/TDD: 1-800-750-0750

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This packet of information is provided as a summary of the Prevailing Wage guidelines and responsibilities. The Ohio Revised Code, Chapter 4115 should be referred to for the exact wording of the law. Also included are references and forms which should be helpful in the compliance of the Prevailing Wage Law.

PACKET INFORMATION INDEX

- A. The Ohio Department of Commerce-Division of Industrial Compliance, Wage and Hour Administration Investigators and their assigned counties**
1. The Wage and Hour Investigators for the State of Ohio are listed with their contact information.
 - a. If you have questions or need assistance pertaining to Prevailing Wage, you can contact the Investigator in your area.
- B. Prevailing Wage Guide for Public Authorities**
1. Notice of change of the Prevailing Wage Threshold Level.
 - a. A notification will be sent to you when there is a change of the Prevailing Wage threshold level
 2. Outline of the Public Authority's responsibilities for Prevailing Wage.
 3. Public Authority's Compliance Checklist form.
 - a. A form for tracking the progress of a Prevailing Wage project
 4. Request form for Prevailing Wage Rates.
 - a. Prevailing Wage Rates can be obtained on the website www.com.ohio.gov
 - (1) Prevailing Wage Determination Schedule of wages must be attached to and made part of the specifications for the project, and must be printed on the bidding blanks where the work is done by contract.
 5. Bid Tabulation form
 - a. A form to be completed and returned to ODOC-DIC-Bureau of Wage and Hour Administration when the contract has been awarded.
 6. Prevailing Wage Bonds form
 - a. Information needed to be kept on file by the Prevailing Wage Coordinator when bonds from the Public Authority are used for a project.
- C. Prevailing Wage Guidelines for the Public Authority's Coordinator**
1. Guideline for the Prevailing Wage Coordinator
 - a. The Prevailing Wage complaint form and instructions can be obtained on the website www.com.ohio.gov
 2. Record of the Certified Payroll Reports Received form
 - a. Helpful form for recording the Certified Payroll Reports and the dates received from the contractors and subcontractors.
 3. Employee Interview form
 - a. Helpful form for the use by the Prevailing Wage Coordinator when making on-site visits.
 4. Employee vs. Independent Contractor
 - a. Helpful questions when determining if a person is an Employee or an Independent Contractor.
- D. Prevailing Wage Guide for Contractors**
(Incorporate this section in the Specifications or supply copies for the pre-construction meeting.)
1. Outline of responsibilities for the Prevailing Wage Contractor
 2. Notification form from the Contractor to the Employee
 - a. The contractor must submit to employees a completed and signed notification form.
 - b. Some Prevailing Wage Coordinators may require a copy of the completed Notification to the Employee form be submitted with the Certified Payroll Reports.
 3. Certified Payroll Report form
 - a. The contractor can use any form/format he chooses as long as **ALL** the information has been provided.
 4. Certified Payroll Report form instruction sheet
 5. Corrected Certified Payroll Report Example
 6. Affidavit of Compliance form
 - a. No Public Authority shall make final payment unless the **Final Affidavits** have been filed by the contractors and subcontractors.



Mike DeWine
Governor

Sheryl Maxfield
Director

INVESTIGATORS CONTACT INFORMATION

OHIO DEPARTMENT OF COMMERCE

Division of Industrial Compliance
Bureau of Wage and Hour Administration
6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
Phone: 614-644-2239
Fax: 614-728-8639
www.com.ohio.gov
TTY/TDD: 1-800-750-0750

The Ohio Department of Commerce is an Equal Opportunity Employer and Service Provider

OHIO DEPARTMENT OF COMMERCE
Division of Industrial Compliance
Bureau of Wage and Hour Administration
Chief, Stephen Clegg

6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
614-644-2239
fax: 614-728-8639
<http://www.com.ohio.gov>

INVESTIGATORS and THEIR HEADQUARTER COUNTY

| | |
|--|--------------|
| #48 Dave Horvath PO Box 1512 Lima, Ohio 45802-1512 Voice: (419) 302-1200 Fax: (614) 728-8639 Dave.Horvath@com.state.oh.us | Allen * |
| #30 Mike McKee P.O. Box 1342 Cambridge, Ohio 43725-2247 Voice/Fax: (740) 432-1987 Michael.McKee@com.state.oh.us | Guernsey* |
| #56 Shawn Miles P.O. Box 2547 North Canton, Ohio 44720 Voice/Fax: (614) 496-9076 Shawn.Miles@com.state.oh.us | Stark * |
| #37 David Rice P.O. Box 41241 Dayton, Ohio 45441 Voice: (740) 502-0883 Fax: (614) 995-7768 Dave.Rice@com.state.oh.us | Montgomery * |
| #35 Sean Seibert P.O. Box 422 Painesville, Ohio 44077-3938 Voice: (614) 557-8662 Fax: (614) 232-9541 Sean.Seibert@com.state.oh.us | Lake * |
| #11 Kela D. Thompson 6606 Tussing Rd, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-5007 Fax: (614) 232-9537 Kela.Thompson@com.state.oh.us | Franklin * |

* **Headquarter County**

| | |
|--|--|
| Stephen Clegg, Chief 6606 Tussing Road, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-8686 Fax: (614) 728-8639 Stephen.Clegg@com.state.oh.us | #90 Jackle Clark, Supervisor 6606 Tussing Rd, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-5019 Fax: (614) 222-2357 Jackie.Clark@com.state.oh.us |
|--|--|



Mike DeWine
Governor

Sheryl Maxfield
Director

PREVAILING WAGE GUIDE FOR PUBLIC AUTHORITIES

OHIO DEPARTMENT OF COMMERCE

Division of Industrial Compliance
Bureau of Wage and Hour Administration
6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
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TTY/TDD: 1-800-750-0750

The Ohio Department of Commerce is an Equal Opportunity Employer and Service Provider

PREVAILING WAGE THRESHOLD LEVELS

IMPORTANT NOTICE

Before advertising for bids, contracting, or undertaking construction with its own forces, to construct a public improvement, the Public Authority shall have the Ohio Department of Commerce-Division of Industrial Compliance, Bureau of Wage and Hour Administration determine the prevailing rates of wages for workers employed on the public improvement. The wage determination must be included in the project specifications and printed on the bidding blanks where work is done by contract.

| | |
|---|------------------|
| “New” construction threshold for <i>Building Construction</i>: | \$250,000 |
| “Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting” threshold level for <i>Building Construction</i>: | \$75,000 |

| | |
|---|-----------------|
| As of January 1, 2018: | |
| “New” construction that involves <i>roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction</i> threshold level has been adjusted to: | \$91,150 |
| “Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting” that involves <i>roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction</i> threshold level has been adjusted to: | \$27,309 |

- A) Thresholds are to be adjusted biennially by the Director of the Ohio Department of Commerce.
- B) Biennial adjustments to threshold levels are made according to the Building Cost for Skilled Labor Index published by McGraw-Hill’s Engineering News-Record, but may not increase or decrease more than 3% for any year.

If there are questions concerning this notification, please contact:

Ohio Department of Commerce
 Division of Industrial Compliance
 Bureau of Wage and Hour Administration
 6606 Tussing Road, PO Box 4009
 Reynoldsburg, Ohio 43068-9009
 Phone: 614-644-2239
 Fax: 614-728-8639
www.com.ohio.gov

Public Authority Responsibilities
ORC Chapter 4115: Wages and Hours on Public Works
(Prevailing Wage Coordinator)

1. Before advertising for bids, contracting, or undertaking construction with its own forces, to construct a public improvement, the public authority shall have the Ohio Department of Commerce, Division of Industrial Compliance, Bureau of Wage and Hour Administration determine the prevailing rates of wages for workers employed on the public improvement. The wage determination must be included in the project specifications and printed on the bidding blanks where work is done by contract.
 - a) "New" construction has a threshold level of **\$250,000**.
 - b) "Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting" has a threshold level of **\$75,000**.
 - c) "New" construction that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction has a threshold level of **\$84,314**.
 - d) "Reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting" that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction has a threshold of **\$25,261**.
 - i.) Thresholds are to be adjusted biennially by the Director of Ohio Department of Commerce, Division of Industrial Compliance, Bureau of Wage and Hour Administration.
 - ii.) Biennial adjustments to threshold levels are made according to the Price Deflator for Construction Index, United States Department of Commerce, Bureau of the Census, but may not increase or decrease more than 3% for any year.
2. Every contract for public work shall contain a provision that each worker employed by the contractor or subcontractor, or other person about or upon the public work, must be paid the prevailing rate of wages.
3. If contracts are not awarded or construction undertaken within ninety days (90) from the date of the determination of the prevailing wage there shall be a re-determination of the wage rates before the contract is awarded.
4. Within **seven (7) working days** after the receipt of notification of a change in the prevailing wage rates, the public authority shall notify all affected contractors and subcontractors. If it is determined that a contractor or subcontractor has violated sections 4115.03 to 4115.16 of the Ohio Revised Code because they were not notified as required, **the public authority is liable** for any back wages, fines, damages, court costs and attorney's fees for the period of time covering the receipt of wage changes, until they give the required notice.
5. No public authority shall award a contract for a public improvement to any contractor or subcontractor whose name appears on the list of debarred contractors. This list is filed with the Secretary of State by the Ohio Department of Commerce-Division of Industrial Compliance & Labor-Bureau of Wage and Hour Administration **The filing of the notice of conviction with the secretary of state constitutes notice to all public authorities.** These contractors are prohibited from working on public improvements for periods ranging from one to three years. The list of debarred contractors can be located on the website www.com.ohio.gov/laws
6. A public authority must designate and appoint **one of its own employees** to serve as the Prevailing Wage Coordinator during the life of the contract for constructing the public improvement. A Prevailing Wage Coordinator must be appointed no later than ten days before the first payment of wages by contractors to employees working on the public improvement.

PUBLIC AUTHORITY'S COMPLIANCE CHECKLIST FOR PREVAILING WAGE

| | | |
|-----------------------|-----|---|
| Project: | | Number: |
| Department: | | Phone#: |
| PW Coordinator: | | Phone#: |
| Architect/Engineer: | | Phone#: |
| Contractor: | | Phone#: |
| Contact Person: | | Title: |
| General Contractor: | | Prime Contractor: |
| | | Construction Mgr: |
| Date Completed | | Compliance Item Description |
| | 1. | Request Prevailing Wage Determination Schedule from ODOC-DIC-Wage & Hour |
| | 2. | Received Prevailing Wage Determination Schedule |
| | 3. | Incorporate Determination Schedule in Specs./Bidding Blanks |
| | 4. | Incorporate notice of Prevailing Wage requirements in Invitation for Bids/Notice to Bidders |
| | 5. | Incorporate Prevailing Wage requirements in Contract |
| | 6. | Submit complete Invitation for Bid to ODOC-DIC-Wage & Hour |
| | 7. | Invitation for Bids |
| | 8. | Bid Opening |
| | 9. | Check Listing of Violators |
| | 10. | Award of Contract. (see note) |
| | 11. | Submit Bid Tabulation/Award to ODOC-DIC-WAGE & HOUR |
| | 12. | Notice to Successful Bidder |
| | 13. | Work Commenced...(see note) |
| | 14. | Appoint Prevailing Wage Coordinator |
| | 15. | Received list of Subcontractors' names, addresses, phone #'s & email's |
| | 16. | Received Payroll Date Schedule |
| | 17. | Received Registered Apprenticeship Agreement Certifications |
| | 18. | Received Deduction Agreements |
| | 19. | Received Payroll Reports with Certification...(see attachment) |
| | 20. | Visited project site |
| | 21. | Received Changes to Determination Schedule |
| | 22. | Notice to Contractors of Determination Schedule change |
| | 23. | Request Final Compliance Affidavit from contractors & subcontractors |
| | 24. | Received Final Affidavits from all contractors & subcontractors |
| | 25. | Certify Final Payment |

Note: If contract is not awarded or construction undertaken within 90 days from the date of establishment of the Prevailing Wage Rates, a re-determination of the Prevailing Wage Rates is required.

REQUEST FOR STATE OF OHIO PREVAILING WAGE RATES

| | | | | | | | |
|---|--|---|------------------|--|---|---|--|
| Date | | (Mark (X) One) | | <input type="checkbox"/> ~ Residential | <input type="checkbox"/> ~ Construction | | |
| Project Information (only one project and one county per request form please) | | | | | | | |
| County of Project | | Project Name | | This form MUST be filled out COMPETELY & CORRECTLY for us to process your request. Forms not completed correctly will be RETURNED TO THE SENDER . | | | |
| Site Address | | City | | | | | |
| Owner/Public Authority | | | | | | Prevailing Wage Rates can be obtained on the website www.com.ohio.gov | |
| Address | | Telephone Number | | ODOC-DIC-WAGE & HOUR DATE STAMP | | | |
| City | | Zip Code | | | | | |
| PW Coordinator | | Telephone Number | | | | | |
| Issuing Authority of Bonds | | Type of Financing | | | | | |
| Estimated Total Overall Project Cost | | | | | | PLEASE MAIL THIS REQUEST TO: Ohio Department of Commerce Division of Industrial Compliance Bureau of Wage & Hour Administration 6606 Tussing Road, PO Box 4009 Reynoldsburg, Ohio 43068-9009 PHONE: (614) 644-2239 FAX: (614) 728-8639 | |
| <input checked="" type="checkbox"/> New Construction | | <input type="checkbox"/> "Old" Construction * | | | | | |
| A copy of this form will be returned to you with your wage rates. You must send that copy to us with your bid tabulations once the contract has been awarded. | | | | | | | |
| Expected Date of Contract Award | | | | PHONE: (614) 644-2239 FAX: (614) 728-8639 | | | |
| Projected Completion Date | | | | | | | |
| Send Wage Rates to: (contractors are charged \$5.00 per county) | | | | ODOC-DIC-W&H DATE STAMP (bid tab) | | | |
| <input type="checkbox"/> Mail | | <input type="checkbox"/> Pick Up | | | | | |
| <input type="checkbox"/> Federal Express Account Number | | | | | | | |
| Name | | Company or Public Authority | | | | | |
| Address | | | | | | | |
| City | | Zip | Telephone Number | | | | |
| * "Old" construction is reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting. | | | | | | | |

BID TABULATION SHEET

| |
|--|
| Please attach a copy of your original dated and stamped “Request for Prevailing Wage Rates” with this Bid Tabulation . Please check mark which company was awarded the contract for the project. (Note: DO NOT SEND UNTIL THE CONTRACT HAS BEEN OFFICIALLY AWARDED.) |
| Ohio Department of Commerce Division of Industrial Compliance, Bureau of Wage & Hour 6606 Tussing Road, PO Box 4009 Reynoldsburg, Ohio 43068-9009 (Phone) 614-644-2239, (Fax) 614-728-8639 www.com.ohio.gov |

| | | | |
|--|-------------------|------------------|------------------|
| Contracting Public Authority: | | | |
| Project Name: | | | |
| <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; border-bottom: 1px solid black;">Project #:</td> <td style="width: 33%; border-bottom: 1px solid black;">Bid Date:</td> <td style="width: 33%; border-bottom: 1px solid black;">Estimate:</td> </tr> </table> | Project #: | Bid Date: | Estimate: |
| Project #: | Bid Date: | Estimate: | |

| | | | | | | |
|------------------------------|----------------------------------|-------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|
| Contract Description: | <input type="checkbox"/> General | <input type="checkbox"/> HVAC | <input type="checkbox"/> Electrical | <input type="checkbox"/> Plumbing | <input type="checkbox"/> Asbestos | <input type="checkbox"/> Other: |
|------------------------------|----------------------------------|-------------------------------|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|

| AWARDED TO (CHECK) | LIST OF THE BIDDING CONTRACTORS | TOTAL BID AMOUNT |
|--------------------------|---------------------------------|------------------|
| <input type="checkbox"/> | | |
| <input type="checkbox"/> | | |
| <input type="checkbox"/> | | |
| <input type="checkbox"/> | | |
| <input type="checkbox"/> | | |
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| <input type="checkbox"/> | | |
| <input type="checkbox"/> | | |

| | |
|------------------------------------|---------------|
| SUBMITTED BY | |
| Print Name: | Title: |
| Telephone Number: () | FAX #: |
| Signature: | EMAIL: |
| | Date: |

INDUSTRIAL DEVELOPMENT BONDS

| Bond Projects require the Public Authority to keep the following information on file | | | |
|---|---------|------|--------------|
| 1. Type of Bonds issued: | Amount: | | |
| 2. The total cost of the Project: | | | |
| 3. The other type of financing involved in the project: | | | |
| 4. Portion of the project being constructed with each type of financing: | | | |
| 5. Are Prevailing Wage Rates being applied to all construction on the project: <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| 6. The name of the political subdivision who issued the bonds: | | | |
| 7. When were the bonds issued: | | | |
| 8. For what purpose were the bonds issued: | | | |
| 9. Who handles the funds once the bonds are sold: | | | |
| 10. Who is the lending institution that purchased the bonds: | | | |
| 11. How are the funds to be paid out: | | | |
| 12. When are the funds to be paid out: | | | |
| 13. Who is the Bond Council: | | | |
| 14. Who has been appointed as the Prevailing Coordinator: | | | |
| PWC Address: | | | |
| City: | OHIO | Zip: | Telephone #: |
| 15. Obtain a copy of the inducement and other official documents for the issuance of the bonds. | | | |



Mike DeWine
Governor

Sheryl Maxfield
Director

PREVAILING WAGE GUIDELINES

FOR THE

PUBLIC AUTHORITY'S

PW COORDINATOR

OHIO DEPARTMENT OF COMMERCE

Division of Industrial Compliance and Labor

Bureau of Wage and Hour Administration

6606 Tussing Road, PO Box 4009

Reynoldsburg, Ohio 43068-9009

Phone: 614-644-2239

Fax: 614-728-8639

www.com.ohio.gov

TTY/TDD: 1-800-750-0750

The Ohio Department of Commerce is an Equal Opportunity Employer and Service Provider

Prevailing Wage Coordinator Guidelines

For more detailed information please refer to Chapter 4115 of the Ohio Revised Code

- A. Attend any pre-bid and/or pre-construction meetings.
 - 1. To explain the prevailing wage rate requirements.
 - 2. To explain the contractor's responsibilities.
- B. Set up and maintain files containing all contractors' and subcontractors' payroll reports, affidavits, and related documents. These files must be available for public inspection.
- C. Obtain from each contractor a list of their subcontractors' names, addresses, telephone numbers, and email addresses.
- D. Require each contractor and subcontractor to provide their project dates. This will be used to make a time schedule for receiving their certified payrolls.
- E. Obtain from each contractor, the name and address of their Bonding/Surety Company.
- F. Obtain from out-of-state corporations, the name and address of their Statutory Agent. (This agent must be located in the State of Ohio and registered with the Ohio Secretary of State.)
 - 1. Records made in connection with the public improvement must not be removed from the State of Ohio for the period of one year following the completion of the project.
- G. Supply contractors with any changes in the Prevailing Wage Rates.
- H. Within two weeks after the first pay, obtain a certified payroll report from each contractor. A certified report is one that is sworn to and signed by the contractor.
 - 1. If the job will exceed four months, all reports after the initial report can be filed once per month. (The initial report must be filed within two weeks.)
 - 2. If the job will last less than four months, all reports are to be filed weekly after the initial report.
- I. Establish and follow procedures to monitor compliance by contractors and subcontractors.
 - 1. Visit project to verify posting requirements and job classifications.
 - 2. Review certified payroll reports to ensure they are submitted in a timely fashion and complete with the following information for each employee:
 - a) Name, current address, and their social security number or last 4 when permitted
 - b) Classification (must be specific for laborers and operators, including level)
 - c) Hours worked on the project
 - d) Hourly rate
 - e) Fringe benefits, if applicable
 - f) Total hours worked for the week (all jobs)
 - g) Gross wages, all deductions, net pay
 - 3. Compare rates and fringes reported to rates in prevailing wage schedule.
- J. Upon completion of the project and prior to the final payment, require an affidavit of compliance from each contractor and subcontractor. **No public authority shall make final payment to any contractor or subcontractor unless the final affidavits have been filed by the respective contractor and subcontractor. (O.R.C. section 4115.07)**
- K. Report any non-compliance to Ohio Department of Commerce, Division of Industrial Compliance, Bureau of Wage & Hour Administration. The PW complaint form and instructions can be obtained on the website www.com.ohio.gov.

RECORD OF THE CERTIFIED PAYROLL REPORTS RECEIVED

| | | |
|-----------------------------|--------------------------|----------------------------------|
| Project: | | Number: |
| Contractor: | | Phone #: Email: |
| General Contractor: | Prime Contractor: | Subcontractor: |
| Date work commenced: | Completed: | Final Affidavit: |

| Payroll | Payroll Date | Date Received | | Payroll | Payroll Date | Date Received |
|---------|--------------|---------------|--|---------|--------------|---------------|
| 1 | | | | 33 | | |
| 2 | | | | 34 | | |
| 3 | | | | 35 | | |
| 4 | | | | 36 | | |
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| 6 | | | | 38 | | |
| 7 | | | | 39 | | |
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| 32 | | | | 64 | | |

PREVAILING WAGE INVESTIGATION\EMPLOYEE INTERVIEW

Failure to complete this interview form may reduce our ability to recover back wages which may be owed to you.

| | | | | |
|---|--------------------------------|---|--|--------------|
| Project: | | | Case #: | |
| Address: | | City: | | County: |
| Employee Name: | | Last 4 digits of the SS#: | | |
| Address: | | City: | State: | Zip: |
| Telephone #: (Home) | (Work) | Email: | Best time to be reached: | |
| Another source by which we can contact you.(Someone not living at your address): | | | | |
| Name: | | Relationship: | | Telephone #: |
| Contractor's Name: | | | Telephone #: | |
| Address: | | City: | State: | Zip: |
| Date hired: | Date started on this project : | Approximate hours - Straight time: | | Overtime: |
| Method of recording hours: <input type="checkbox"/> Time Card <input type="checkbox"/> Called into office | | Recorded by: <input type="checkbox"/> Employee <input type="checkbox"/> Foreman | | |
| Did you keep a personal record of your hours worked on this project? <input type="checkbox"/> Yes <input type="checkbox"/> No | | Do you have check stubs? <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| Did anyone else keep a personal record ? <input type="checkbox"/> Yes <input type="checkbox"/> No | | If yes, who: | | |
| List your job classification(s): | | | <input type="checkbox"/> Journeyman <input type="checkbox"/> Helper <input type="checkbox"/> Apprentice - Level | |
| List your specific job duties: | | List tools\equipment used: | | |
| Hourly rate of pay for this project: | | Your regular rate of pay: | | |
| Fringe benefits paid by contractor: <input type="checkbox"/> None <input type="checkbox"/> Health Insurance <input type="checkbox"/> Life Insurance <input type="checkbox"/> Pension <input type="checkbox"/> Bonus ~ Vacation - Amount _____ <input type="checkbox"/> Holidays - Amount _____ <input type="checkbox"/> Apprenticeship training <input type="checkbox"/> Profit Sharing ~ Other (list): | | | | |
| Did you work overtime? <input type="checkbox"/> Yes <input type="checkbox"/> No | | Were hours over 40 per week paid at time and one half? <input type="checkbox"/> Yes <input type="checkbox"/> No | | |
| When is your pay day? | | Method of payment: <input type="checkbox"/> Check <input type="checkbox"/> Cash <input type="checkbox"/> Direct Deposit | | |
| List names of co-workers on this project: | | | | |
| Comments: | | Please provide a detailed list of the dates, times and hours worked within each classification that may apply to the work performed on a separate sheet. | | |
| SIGNATURE AND NOTARY | | | | |
| Affiant is further informed that Section 2921.13 of the Ohio Revised Code provides a penalty of a misdemeanor of the first degree and that prosecution will be pursued of those persons who "knowingly swear or affirm the truth of a false statement when ...the statement is sworn or affirmed before a notary public..." Sworn to before me and subscribed by the said: _____ In my presence this _____ day of _____, 20_____. _____ Notary Public | | I hereby certify that this is a true statement to the best of my knowledge and belief. _____ Signature Date Return to: Ohio Department of Commerce Division of Industrial Compliance & Labor Bureau of Wage and Hour Administration 6606 Tussing Road P.O. Box 4009 Reynoldsburg, Ohio 43068-9009 (614) 644-2239 www.com.ohio.gov | | |
| Signature of PW Coordinator: | | | | Date: |

EMPLOYEE VS. INDEPENDENT CONTRACTOR

| | | | | | | |
|----------|---|---|---|-----------------------------|---|------------------------|
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Does the employer have the right to control and direct worker? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Does the worker receive instructions about how and where the work is to be done instead of the employer merely specifying the desired result? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Is payment based on time spent rather than a set price for the work to be performed? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Does the worker devote virtually all his working time to the employer rather than offering services to the general public? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Does the worker performing services make their services available to the general public and/or other businesses? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Is there a continuing relationship between employer and worker? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Can the worker be discharged at will? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Did the employer train the worker for the job? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |
| EMPLOYEE | ↔ | <input checked="" type="checkbox"/> YES | Does the employer have employees performing the same work as the independent contractor? | <input type="checkbox"/> NO | ↔ | INDEPENDENT CONTRACTOR |

EMPLOYEE VS. INDEPENDENT CONTRACTOR-continued

EMPLOYEE ↔ YES NO ↔ INDEPENDENT CONTRACTOR
Does the worker perform services personally rather than delegating them to others?

EMPLOYEE ↔ YES NO ↔ INDEPENDENT CONTRACTOR
Does the employer set a specific time when the individual services are to be performed?

EMPLOYEE ↔ YES NO ↔ INDEPENDENT CONTRACTOR
Does the employer furnish the tools and materials used by the worker performing services?

EMPLOYEE ↔ YES NO ↔ INDEPENDENT CONTRACTOR
Is the employer assuming all the financial risk, rather than the worker making a significant financial investment in the job and having the opportunity to realize a profit or loss from the work?

EMPLOYEE ↔ NO YES ↔ INDEPENDENT CONTRACTOR
Does the individual performing the services publicly advertise these services in for example, the newspaper or yellow pages ?

EMPLOYEE ↔ NO YES ↔ INDEPENDENT CONTRACTOR
Does the individual performing the services have a business license?

EMPLOYEE ↔ NO YES ↔ INDEPENDENT CONTRACTOR
Does the individual performing the services operate d.b.a. or under a tradename?



Mike DeWine
Governor

Sheryl Maxfield
Director

PREVAILING WAGE GUIDE FOR CONTRACTORS

OHIO DEPARTMENT OF COMMERCE

Division of Industrial Compliance
Bureau of Wage and Hour Administration
6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
Phone: 614-644-2239
Fax: 614-728-8639
www.com.ohio.gov
TTY/TDD: 1-800-750-0750

The Ohio Department of Commerce is an Equal Opportunity Employer and Service Provider

OHIO DEPARTMENT OF COMMERCE
Division of Industrial Compliance
Bureau of Wage and Hour Administration
Chief, Stephen Clegg

6606 Tussing Road, PO Box 4009
Reynoldsburg, Ohio 43068-9009
614-644-2239
fax: 614-728-8639
<http://www.com.ohio.gov>

INVESTIGATORS and THEIR HEADQUARTER COUNTY

| | |
|--|--------------|
| #48 Dave Horvath PO Box 1512 Lima, Ohio 45802-1512 Voice: (419) 302-1200 Fax: (614) 728-8639 Dave.Horvath@com.state.oh.us | Allen * |
| #30 Mike McKee P.O. Box 1342 Cambridge, Ohio 43725-2247 Voice/Fax: (740) 432-1987 Michael.McKee@com.state.oh.us | Guernsey* |
| #56 Shawn Miles P.O. Box 2547 North Canton, Ohio 44720 Voice/Fax: (614) 496-9076 Shawn.Miles@com.state.oh.us | Stark * |
| #37 David Rice P.O. Box 41241 Dayton, Ohio 45441 Voice/Fax: (740) 502-0883 Dave.Rice@com.state.oh.us | Montgomery * |
| #35 Sean Seibert P.O. Box 422 Painesville, Ohio 44077-3938 Voice: (614) 557-8662 Fax: (614) 232-9541 Sean.Seibert@com.state.oh.us | Lake * |
| #11 Kela D. Thompson 6606 Tussing Rd, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-5007 Fax: (614) 232-9537 kela.thompson@com.state.oh.us | Franklin * |

* Headquarter County

| | |
|--|--|
| Stephen Clegg, Chief 6606 Tussing Road, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-8686 Fax: (614) 728-8639 Stephen.Clegg@com.state.oh.us | #90 Jackie Clark, Supervisor 6606 Tussing Rd, PO Box 4009 Reynoldsburg, Ohio 43068-9009 Voice: (614) 728-5019 Fax: (614) 222-2357 Jackie.Clark@com.state.oh.us |
|--|--|



PREVAILING WAGE CONTRACTOR RESPONSIBILITIES

This is a summary of prevailing wage contractors' responsibilities. For more detailed information please refer to Chapter 4115 of the Ohio Revised Code

General Information

Ohio's prevailing wage laws apply to all public improvements financed in whole or in part by public funds when the total overall project cost is fairly estimated to be more than \$250,000 for new construction or \$75,000 for reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting.

Ohio's prevailing wage laws apply to all public improvements financed in whole or in part by public funds when the total overall project cost is fairly estimated to be more than \$91,150 for new construction that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction or \$27,309 for reconstruction, enlargement, alteration, repair, remodeling, renovation, or painting of a public improvement that involves roads, streets, alleys, sewers, ditches and other works connected to road or bridge construction.

- a) Thresholds are to be adjusted biennially by the Administrator of Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration
- b) Biennial adjustments to threshold levels are made according to the Price Deflator for Construction Index, United States Department of Commerce, Bureau of the Census*, but may not increase or decrease more than 3% for any year

Penalties for violation

Violators are to be assessed the wages owed, plus a penalty of 100% of the wages owed.

Intentional Violations

If an intentional violation is determined to have occurred, the contractor is prohibited from contracting directly or indirectly with any public authority for the construction of a public improvement. Intentional violation means "a willful, knowing, or deliberate disregard for any provision" of the prevailing wage law and includes but is not limited to the following actions:

- Intentional failure to submit payroll reports as required, or knowingly submitting false or erroneous reports.
- Intentional misclassification of employees for the purpose of reducing wages.
- Intentional misclassification of employees as independent contractors or as apprentices.
- Intentional failure to pay the prevailing wage.
- Intentional failure to comply with the allowable ratio of apprentices to skilled workers as required by the regulations established by Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration.
- Intentionally employing an officer, of a contractor or subcontractor, that is known to be prohibited from contracting, directly or indirectly, with a public authority.



Responsibilities

- A. Pay the prevailing rate of wages as shown in the wage rate schedules issued by the Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration, for the classification of work being performed.
 - 1. Wage rate schedules include all modifications, corrections, escalations, or reductions to wage rates issued for the project.
 - 2. Overtime must be paid at time and one-half the employee's base hourly rate. Fringe benefits are paid at straight time rate for all hours including overtime.
 - 3. Prevailing wages must be paid in full without any deduction for food, lodging, transportation, use of tools, etc.; unless, the employee has voluntarily consented to these deductions in writing. The public authority and the Director of Ohio Department of Commerce, Division of Industrial Compliance and Labor, Bureau of Wage and Hour Administration - must approve these deductions as fair and reasonable. Consent and approval must be obtained before starting the project.

- B. Use of Apprentices and Helpers cannot exceed the ratios permitted in the wage rate schedules.
 - 1. Apprentices must be registered with the U.S. Department of Labor Bureau of Apprenticeship and Training.
 - 2. Contractors must provide the Prevailing Wage Coordinator a copy of the Apprenticeship Agreement for each apprentice on the project.

- C. Keep full and accurate payroll records available for inspection by any authorized representative of the Ohio Department of Commerce, Division of Industrial Compliance, and Labor, Bureau of Wage and Hour Administration or the contracting public authority, including the Prevailing Wage Coordinator. Records should include but are not limited to:
 - 1. Time cards, time sheets, daily work records, etc.
 - 2. Payroll ledger\journals and canceled checks\check register.
 - 3. Fringe benefit records must include program, address, account number, & canceled checks.
 - 4. Records made in connection with the public improvement must not be removed from the State for one year following the completion of the project.
 - 5. Out-of-State Corporations must submit to the Ohio Secretary of State the full name and address of their Statutory Agent in Ohio.

- D. Prevailing Wage Rate Schedule must be posted on the job site where it is accessible to all employees.

- E. Prior to submitting the initial payroll report, supply the Prevailing Wage Coordinator with your project dates to schedule reporting of your payrolls.

- F. Supply the Prevailing Wage Coordinator a list of all subcontractors including the name, address, and telephone number for each.
 - 1. **Contractors are responsible for their subcontractors' compliance with requirements of Chapter 4115 of the Ohio Revised Code.**



**Department
of Commerce**

Division of Industrial Compliance

- G. Before employees start work on the project, supply them with written notification of their job classification, prevailing wage rate, fringe benefit amounts, and the name of the Prevailing Wage Coordinator for the project. A copy of the completed signed notification should be submitted to Prevailing Wage Coordinator.
- H. Supply all subcontractors with the Prevailing Wage Rates and changes.
- I. Submit certified payrolls within two (2) weeks after the initial pay period. Payrolls must include the following information:
 - 1. Employees' names, addresses, and social security numbers.
 - a. Corporate officers/owners/partners and any salaried personnel who do physical work on the project are considered employees. All rate and reporting requirements are applicable to these individuals.
 - 2. Employees' work classification.
 - a. Be specific about the laborers and/or operators (Group)
 - b. For all apprentices, show level/year and percent of journeyman's rate
 - 3. Hours worked on the project for each employee.
 - a. The number of hours worked in each day and the total number of hours worked each week.
 - 4. Hourly rate for each employee.
 - a. The minimum rate paid must be the wage rate for the appropriate classification. The Department's Wage Rate Schedule sets this rate.
 - b. All overtime worked is to be paid at time and one-half for all hours worked more than forty (40) per week.
 - 5. Where fringes are paid into a bona fide plan instead of cash, list each benefit and amount per hour paid to program for each employee.
 - a. When the amount contributed to the fringe benefit plan and the total number of hours worked by the employee on all projects for the year are documented, the hourly amount is calculated by dividing the total contribution of the employer by the total number of hours worked by the employee.
 - b. When the amount contributed to the fringe benefit is documented but not the total hours worked, the hourly amount is calculated by **dividing the total yearly contribution by 2080**.
 - 6. Gross amount earned on all projects during the pay period.
 - 7. Total deductions from employee's wages.
 - 8. Net amount paid.
- J. The reports shall be certified by the contractor, subcontractor, or duly appointed agent stating that the payroll is correct and complete; and that the wage rates shown are not less than those required by the O.R.C. 4115.
- K. Provide a Final Affidavit to the Prevailing Wage Coordinator upon the completion of the project.

PREVAILING WAGE NOTIFICATION to EMPLOYEE

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

| | |
|-------------------|-------------|
| Project Name: | Job Number: |
| Contractor: | |
| Project Location: | |

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

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

| Classification: | Prevailing Wage Rate Total Package: | Minus your fringe benefits *: | Your hourly base rate and overtime: |
|-----------------|-------------------------------------|-------------------------------|-------------------------------------|
| | | | / |
| | | | / |
| | | | / |
| | | | / |
| | | | / |
| | | | / |

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

| Fringe | Amount | Fringe | Amount |
|------------------|--------|-------------------------------|--------|
| Health Insurance | | Vacation | |
| Life Insurance | | Holiday | |
| Pension | | Sick Pay | |
| Other (Specify) | | Training | |
| Other (Specify) | | Total Hourly Fringes * | |

| | |
|-------------------------|-------|
| Contractor's Signature: | Date: |
| Employee's Signature: | Date: |

INSTRUCTIONS FOR PREPARING CERTIFIED PAYROLL REPORTS

General

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

Ohio Department of Commerce
Division of Industrial Compliance and Labor
Bureau of Wage & Hour Administration
6606 Tussing Rd, P. O. Box 4009
Reynoldsburg, OH 43068-9009
Phone: (614) 644-2239
www.com.ohio.gov

Certified Payroll Heading

Employer name and address: Company's full name and address... Indicate if the company is a subcontractor.

Subcontractor: Check and list the name of the General Contractor or Prime.

Project: Name and location of the project, including county.

Contracting Public Authority: Name and address of the contracting public authority... (Owner of the project).

Week Ending: Month, day, and year for the last day of the reporting period.

Payroll #: Indicate first, second, third, etc. payroll filed by the company for the project.

Page Indicator: number of pages included in the report.

Project Number: Determined by the public authority... if there is no number leave it blank.

Payroll Information by Column

- Employee Name, Address and Social Security number:** This information must be provided for all employees that perform physical labor on the project. Corporate officers, partners, and salaried employees are considered employees and must be paid the prevailing rate. Individual sole proprietors do not have to pay themselves prevailing rate but must report their hours on the project.
- Work Class:** List classification of work actually performed by employee. If unsure of work classification, consult the Ohio department of Commerce, Wage and Hour Bureau. Employees working more than one classification should have separate line entries for each classification. Indicate what year/level for Apprentices. Be specific when using laborer and operator classifications; for example, Backhoe Operator or Asphalt Laborer.
- Hours Worked, Day & Date:** In the first row of column 3 enter days of pay period example; M T W T H F S S. The second row is for the date that corresponds with each day for the pay period. In the employee information section enter the number of hours worked on the prevailing wage project and which day the hours were worked. Separate rows are labeled for (ST) straight time hours and (OT) overtime hours. All hours worked after 40, must be paid at the appropriate overtime rate.
- Project Total Hours:** Total the hours entered for pay period.
- Base Rate:** Enter actual rate per hour paid to the employee. The overtime hourly rate is time and one-half the base rate listed in the prevailing wage schedule plus fringe benefits at straight time rate. The prevailing wage schedule lists the base rate plus fringe benefit amounts. These amounts added together equal the total prevailing wage rate. Employers must pay this total amount in one of three ways.
 - Total rate may be paid in entirety in the base rate to the employee; in which case, the cash designation will be checked for fringe benefits.
 - Total rate may be paid as listed in prevailing wage rate schedule with total fringe amounts paid approved plans.
 - Total rate may be paid with a combination of base rate and fringe payments to approved plans in amounts other than those listed in schedule.
- Project Gross:** Enter total gross wages earned on the project for straight time and overtime. Project hours X base rate should equal project gross.
- Fringes:** If fringe benefits are paid in the hourly base rate, indicate this by marking the **Cash** space. If fringe benefits are paid to approved plans as listed in the prevailing wage rate schedule, mark the space **Approved Plans**. If fringe benefits are paid partially in the base rate and partially to approved plans, mark the space **Cash & Approved plans**. List the hourly amount paid to approved plans for each fringe. If payments are not made on a per hour basis, **calculate the hourly fringe credit by dividing the yearly employer contribution by the lesser of: hours actually worked in the year (these must be documented) or 2080.** Fringe benefits include: **Employer's share** of health insurance, life insurance, retirement plan, bonus/profit sharing, sick pay, holiday pay, personal leave, vacation, and education/training programs. If unsure of a possible fringe benefit, contact the Ohio Department of Commerce - Division of Industrial Compliance and Labor - Bureau of Wage & Hour Administration.
- Total Hours All Jobs:** Total all hours worked during the pay period including non-prevailing wage jobs.
- Total Gross All Jobs:** Gross amount earned in the pay period for all hours worked.
- Self explanatory.
- Self explanatory

Certified Payroll Report

Report for: Check if Subcontractor¹⁾ Contract No: _____ Payroll No: _____
 Company: ¹⁾ _____ If Sub, GC/Prime Contractor Name: _____ Project Name & Location: _____
 Address: _____ Public Authority (Owner): _____ Week Ending: _____
 City, State, Zip _____ Sheet:²⁾ _____ of _____

| 1. Employee Name, Address, & SS# (Last 4 digits if permitted) | 2. Work Class ³⁾ | 3. Prevailing Wage Project | | 4. Total Hours | 5. Base Rate | 6. Project Gross | 7. Fringes: | | | | | 8. Total Hrs for all Jobs | Weekly Payroll Amount | | | | |
|---|-----------------------------|----------------------------|--|----------------|--------------|------------------|-----------------------|------|----------------|--|------|---------------------------|----------------------------|----------------------|-------------------------|-----|-----|
| | | Hours Worked - Day & Date | | | | | Cash & Approved Plans | Cash | Approved Plans | Fringe Rate Your Company Pays Per Hour | | | 9. Total Gross on All Jobs | 10. Total Deductions | 11. Net Pay on All Jobs | | |
| | | | | | | | | | | H&W | Pens | | | | | Vac | Hol |
| | | | | | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | | | | |

1) By signing below, I certify that: (1) I pay, or supervise the payment of the employees shown above; (2) during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done; (3) the fringe benefits have been paid as indicated above; (4) no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in ORC Chapter 4115; and (5) apprentices are registered with the U.S. Dept. of Labor, Bureau of Apprenticeship and Training. I understand that the willful falsification of any of the above statements may subject the Contractor or Subcontractor to civil or criminal prosecution.

Type or Print Name and Title _____ Signature _____ Date _____

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

DO NOT REDO FORM AND CHANGE RATES IF AN ERROR HAS BEEN MADE! SUBMIT A CORRECTED REPORT

*** CORRECTED ***

Certified Payroll Report

Fill out all other areas of the form as usual

Total Hours being corrected for this indiv.

Difference in base rate & corrected base rate if applicable

Difference in fringes & corrected fringes if applicable.

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

Put the period that is being corrected, i.e.: Oct 26 to Nov 02, not individual weekly dates

Report for: Check if Subcontractor¹⁾ Contract No: _____ Payroll No: _____
 Company:¹⁾ _____ If Sub, GC/Prime Contractor Name: _____ Project Name & Location: _____
 Address: _____ City, State, Zip _____ Public Authority (Owner): _____
 Phone No: _____ Week Ending: _____ Sheet:²⁾ _____ of _____

| 1. Employee Name, Address, & SS# (Last 4 digits if permitted) | 2. Work Class ³⁾ | 3. Prevailing Wage Project Hours Worked - Day & Date | 4. Total Hours | 5. Base Rate | 6. Project Gross | 7. Fringe ⁴⁾ | Fringe Rate Your Company Pays Per Hour | | | | 8. Total Hrs for all Jobs | 9. Total Gross on All Jobs | 10. Total Deductions | 11. Net Pay on All Jobs |
|---|-----------------------------|--|----------------|--------------|------------------|-------------------------|--|------|-----|-----|---------------------------|----------------------------|----------------------|-------------------------|
| | | | | | | | H&W | Pens | Vac | Hol | | | | |
| Name Address Last 4 SSN | Class | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | |
| | OT | | | | | | | | | | | | | |
| | ST | | | | | | | | | | | | | |

1) By signing below, I certify that: (1) I pay, or supervise the payment of the employees shown above; (2) during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done; (3) the fringe benefits have been paid as indicated above; (4) no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in CRC Chapter 4115; and (5) apprentices are registered with the U.S. Dept. of Labor, Bureau of Apprenticeship and Training. I understand that the willful falsification of any of the above statements may subject the Contractor or Subcontractor to civil or criminal prosecution.

Type or Print Name and Title _____ Signature _____ Sign _____ Date _____

11/1/14 jc ²⁾ Attach additional sheets as necessary. ³⁾ Type in continuous line, text will wrap.

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

IMPORTANT NOTICE - This process may be different if the Public Authority is using LCPTracker or some other online system to collect Certified Payroll Report from the contractors.



Affidavit of Compliance

Prevailing Wages

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

do hereby certify that the wages paid to all employees of

_____ (Company Name)

for all hours worked on the

_____ (Project name and location)

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

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

_____ (Signature of Officer or Agent)

Sworn to and subscribed in my presence this _____ day of _____, 20_____.

_____ (Notary Public)

The above affidavit must be executed and sworn to by the officer or agent of the contractor or subcontractor who supervises the payment of employees. This affidavit must be submitted to the owner (public authority) before the surety is released or final payment due under the terms of the contract is made.

Prevailing Wage Determination Cover Letter

County: ▾
Determination Date: 03/26/2020
Expiration Date: 06/26/2020

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

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

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

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

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

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

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

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

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

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

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

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

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

wh1500

Prevailing Wage Rate

Skilled Crafts

Name of Union: Asbestos Local 8 Heat & Frost Insulators

Change # : LCN01-2020fbAsbLoc8

Craft : Asbestos Worker Effective Date : 03/01/2020 Last Posted : 02/26/2020

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Asbestos Insulators | \$30.07 | | \$6.89 | \$9.35 | \$0.41 | \$0.00 | \$2.10 | \$0.00 | \$0.00 | \$0.00 | \$48.82 | \$63.86 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st year | 45.90 | \$13.80 | \$6.89 | \$5.10 | \$0.41 | \$0.00 | \$2.10 | \$0.00 | \$0.00 | \$0.00 | \$28.30 | \$35.20 |
| 2nd year | 53.20 | \$16.00 | \$6.89 | \$6.65 | \$0.41 | \$0.00 | \$2.10 | \$0.00 | \$0.00 | \$0.00 | \$32.05 | \$40.05 |
| 3rd year | 58.20 | \$17.50 | \$6.89 | \$6.65 | \$0.41 | \$0.00 | \$2.10 | \$0.00 | \$0.00 | \$0.00 | \$33.55 | \$42.30 |
| 4th year | 63.20 | \$19.00 | \$6.89 | \$6.65 | \$0.41 | \$0.00 | \$2.10 | \$0.00 | \$0.00 | \$0.00 | \$35.05 | \$44.56 |

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

Ratio :

- 1 Journeymen to 1 Apprentice
- 2 Journeymen to 2 Apprentice
- 3 Journeymen to 3 Apprentice
- 3 Journeymen to 1 Apprentice there After

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, BROWN, BUTLER*, CLERMONT, HAMILTON, HIGHLAND, WARREN*

Special Jurisdictional Note : In Butler County: townships of Fairfield, Hanover, Liberty, Milford, Morgan, Oxford, Ripley, Ross, St. Clair, Union & Wayne. In Warren County: Townships of Deerfield, Hamilton, Harlan, Salem, Union & Washington

Details :

All work in connection with Asbestos Removal, Abatement, Encapsulation, Lead Abatement, Hazardous Materials and Fire Stopping which is performed by employees in the Mechanic or Apprentice Classification shall be covered under the terms of this Agreement.

Prevailing Wage Rate Skilled Crafts

Name of Union: Asbestos Local 50 Zone 1

Change # : LCN01-2020fbLoc50

Craft : Asbestos Worker Effective Date : 03/25/2020 Last Posted : 03/25/2020

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|------------------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Asbestos Insulation Mechanic | \$32.33 | | \$7.45 | \$7.24 | \$0.44 | \$0.00 | \$2.50 | \$0.15 | \$0.00 | \$0.00 | \$50.11 | \$66.28 |
| Firestop Technician | \$32.33 | | \$7.45 | \$7.24 | \$0.44 | \$0.00 | \$2.50 | \$0.15 | \$0.00 | \$0.00 | \$50.11 | \$66.28 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st year | 52.83 | \$17.08 | \$7.21 | \$0.00 | \$0.40 | \$0.00 | \$0.00 | \$0.15 | \$0.00 | \$0.00 | \$24.84 | \$33.38 |
| 2nd year | 63.23 | \$20.44 | \$7.21 | \$0.91 | \$0.40 | \$0.00 | \$0.00 | \$0.15 | \$0.00 | \$0.00 | \$29.11 | \$39.33 |
| 3rd year | 72.65 | \$23.49 | \$7.21 | \$1.81 | \$0.40 | \$0.00 | \$0.30 | \$0.15 | \$0.00 | \$0.00 | \$33.36 | \$45.10 |
| 4th year | 83.05 | \$26.85 | \$7.21 | \$1.81 | \$0.40 | \$0.00 | \$0.30 | \$0.15 | \$0.00 | \$0.00 | \$36.72 | \$50.15 |

Special Calculation Note : Other is Industry Fund.

Ratio :

4 Journeymen to 1 Apprentice Company Wide
except no apprentice may work on the jobsite without a Mechanic

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, AUGLAIZE, BUTLER*, CLINTON, CRAWFORD, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HARDIN, HOCKING, KNOX, LICKING, LOGAN, MADISON, MARION, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, ROSS, SHELBY, UNION, VINTON, WARREN*

Special Jurisdictional Note : Township of Butler County-Townships of Lemon and Madison. Warren County-Township of Cleer Creek, Franklin, Massie, Turtle Creek and Wayne

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Asbestos Local 207 OH

Change # : LCN01-2018fbLoc207OH

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

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

Special Calculation Note :

Ratio :

3 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note : Butler County:(townships of Fairfield,Hanover,Liberty,Milford,Morgan,Oxford,Ripley,Ross,StClair,Union & Wayne.) (Lemon & Madison) Warren County: (townships of: Deerfield, Hamilton, Harlan, Salem, Union & Washington). (Clear Creek, Franklin, Mossie, Turtle Creek & Wayne). Ashtabula County: (post offices & townships of Ashtabula, Austinburg, Geneva, Harperfield, Jefferson, Plymouth & Saybrook) (townships of Andover, Cherry Valley, Colbrook, Canneaut, Denmark, Dorset, East Orwell, Hartsgrove, Kingville, Lenox, Monroe,Morgan,New Lyme,North Kingsville, Orwell, Pierpoint, Richmond Rock Creek, Rome, Sheffield, Trumbull, Wayne, Williamsfield & Windsor) Erie County:(post offices & townships of Berlin, Berlin Heights,Birmingham,Florence ,Huron, Milan, Shinrock & Vermillion)

Details :

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

On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers. An Abatement Journeyman is anyone who has more than 300 hours in the Asbestos Abatement field.

Prevailing Wage Rate Skilled Crafts

Name of Union: Boilermaker Local 105

Change # : LCN02-2013fbLoc 105

Craft : Boilermaker Effective Date : 10/01/2013 Last Posted : 09/25/2013

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|----------------|---------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Boilermaker | \$35.26 | | \$7.07 | \$13.28 | \$0.89 | \$0.00 | \$3.00 | \$0.55 | \$0.00 | \$0.00 | \$60.05 | \$77.68 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 6 months | 70.03 | \$24.69 | \$7.07 | \$11.30 | \$0.89 | \$0.00 | \$2.10 | \$0.55 | \$0.00 | \$0.00 | \$46.60 | \$58.95 |
| 2nd 6 months | 75.02 | \$26.45 | \$7.07 | \$11.30 | \$0.89 | \$0.00 | \$2.25 | \$0.55 | \$0.00 | \$0.00 | \$48.51 | \$61.74 |
| 3rd 6 months | 80.00 | \$28.21 | \$7.07 | \$11.30 | \$0.89 | \$0.00 | \$2.40 | \$0.55 | \$0.00 | \$0.00 | \$50.42 | \$64.52 |
| 4th 6 months | 85.02 | \$29.98 | \$7.07 | \$11.30 | \$0.89 | \$0.00 | \$2.55 | \$0.55 | \$0.00 | \$0.00 | \$52.34 | \$67.33 |
| 5th 6 months | 87.52 | \$30.86 | \$7.07 | \$13.28 | \$0.89 | \$0.00 | \$2.63 | \$0.55 | \$0.00 | \$0.00 | \$55.28 | \$70.71 |
| 6th 6 months | 90.03 | \$31.74 | \$7.07 | \$13.28 | \$0.89 | \$0.00 | \$2.70 | \$0.55 | \$0.00 | \$0.00 | \$56.23 | \$72.11 |
| 7th 6 months | 92.50 | \$32.62 | \$7.07 | \$13.28 | \$0.89 | \$0.00 | \$2.78 | \$0.55 | \$0.00 | \$0.00 | \$57.19 | \$73.49 |
| 8th 6 months | 95.00 | \$33.50 | \$7.07 | \$13.28 | \$0.89 | \$0.00 | \$2.85 | \$0.55 | \$0.00 | \$0.00 | \$58.14 | \$74.89 |

Special Calculation Note : Other is Supplemental Health and Welfare

Ratio :

5 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ATHENS, BROWN, BUTLER,
CHAMPAIGN, CLARK, CLERMONT, CLINTON,
FAIRFIELD, FAYETTE, FRANKLIN, GALLIA,
GREENE, GUERNSEY, HAMILTON, HIGHLAND,
HOCKING, JACKSON, LAWRENCE, LICKING,
MADISON, MEIGS, MIAMI, MONTGOMERY,
MORGAN, MUSKINGUM, NOBLE, PERRY,
PICKAWAY, PIKE, PREBLE, ROSS, SCIOTO,
VINTON, WARREN

Special Jurisdictional Note :

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Boilermaker Local 154

Change # : LCN01-2012kpLoc 154

Craft : Boilermaker Effective Date : 03/22/2012 Last Posted : 03/22/2012

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|---------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Boilermaker | \$36.17 | | \$8.57 | \$11.28 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$62.56 | \$80.65 |
| Trainee 60% | \$23.25 | | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$41.95 | \$53.57 |
| Trainee 70% | \$27.13 | | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$45.83 | \$59.40 |
| Trainee 80% | \$31.00 | | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$49.70 | \$65.20 |
| Trainee 90% | \$34.88 | | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$53.58 | \$71.02 |
| Apprentice Registered After 11/01/2005 | Percent | | | | | | | | | | | |
| 1st 6 months | 60.00 | \$21.70 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$40.40 | \$51.25 |
| 2nd 6 months | 65.00 | \$23.51 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$42.21 | \$53.97 |
| 3rd 6 months | 70.00 | \$25.32 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$44.02 | \$56.68 |
| 4th 6 months | 75.00 | \$27.13 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$45.83 | \$59.39 |
| 5th 6 months | 80.00 | \$28.94 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$47.64 | \$62.10 |
| 6th 6 months | 85.00 | \$30.74 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$49.44 | \$64.82 |
| 7th 6 months | 90.00 | \$32.55 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$51.25 | \$67.53 |
| 8th 6 months | 95.00 | \$34.36 | \$8.57 | \$3.59 | \$0.55 | \$0.00 | \$4.25 | \$0.34 | \$0.00 | \$1.40 | \$53.06 | \$70.24 |

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

Ratio :
5 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :
BUTLER, COLUMBIANA, FAYETTE, JEFFERSON,
LAWRENCE, MERCER, WARREN, WASHINGTON

Special Jurisdictional Note :

Details :

Work includes but not limited to: boiler making, acetylene burning, riveting, chipping, caulking, rigging, fitting-up, grinding, reaming, impact machine operating, unloading, and handling of boilermaker's material and equipment. Boilermakers, Blacksmiths, Forgers, Iron Shipbuilders

Prevailing Wage Rate Skilled Crafts

Name of Union: Bricklayer Local 18

Change # : LCN01-2019fbLoc18

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

| Classification | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|-----------------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Bricklayer | \$28.66 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.32 | \$57.65 |
| Stone Mason | \$28.66 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.32 | \$57.65 |
| Pointer Caulker Cleaner | \$28.66 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.32 | \$57.65 |
| Refractory Workers | \$29.66 | | \$8.75 | \$5.38 | \$0.52 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$44.31 | \$59.14 |
| Refractory Worker Hot Pay | \$31.66 | | \$8.75 | \$5.38 | \$0.52 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$46.31 | \$62.14 |
| Sawman | \$28.91 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.57 | \$58.03 |
| Layout Man | \$28.91 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.57 | \$58.03 |
| Free Standing Chimney | \$29.16 | | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.82 | \$58.40 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 6 months | 60.00 | \$17.20 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.86 | \$40.45 |
| 2nd 6 months | 65.00 | \$18.63 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$33.29 | \$42.60 |
| 3rd 6 months | 70.00 | \$20.06 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$34.72 | \$44.75 |
| 4th 6 months | 75.00 | \$21.50 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.16 | \$46.90 |
| 5th 6 months | 80.00 | \$22.93 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.59 | \$49.05 |
| 6th 6 months | 85.00 | \$24.36 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$39.02 | \$51.20 |
| 7th 6 months | 90.00 | \$25.79 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.45 | \$53.35 |
| 8th 6 months | 95.00 | \$27.23 | \$8.75 | \$5.38 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$41.89 | \$55.50 |
| MASON FINISHER 1st 180 Days | 45.00 | \$12.90 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$12.90 | \$19.35 |
| | 45.00 | \$12.90 | \$8.75 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$21.65 | \$28.10 |

| | | | | | | | | | | | | | |
|-----------------------------------|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--|
| 1st Year H&W after 6 months | | | | | | | | | | | | | |
| 2nd Year | 50.00 | \$14.33 | \$8.75 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$23.08 | \$30.25 | |

Special Calculation Note : **In order to utilize a Pre-Apprentice, you must have 1 Registered Apprentice in your employ.

Ratio :

- 1-2 Journeyman to 1 Apprentice
- 3-4 Journeyman to 2 Apprentice
- 5-6 Journeyman to 2 Apprentice
- 7-10 Journeyman to 3 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, HAMILTON, PREBLE*, WARREN

- 1 Apprentice permits 1 Mason Trainee
- 2 Apprentice permits 1 Mason Trainee
- 3 Apprentice permits 2 Mason Trainees
- 4 Apprentice permits 2 Mason Trainees

For each additional 5 Journeyman to 1 Apprentice,
for every 3 additional Apprentices, 1 Mason Finisher
may be added

Special Jurisdictional Note : In Preble County the following townships are included: (Dixon, Gasper, Graits, Israel, Lanier and Somers)

Details :

MASON FINISHER:duties shall be to work in all aspects of Masonry construction taking direction from the employer and the Journeyman Bricklayer & Stone Mason's working on the job. Mason Finisher's may work on job site only when a registered apprentice is on job and the ratios in table above will strictly be enforced.

Refractory work is classified as working with any of the following materials:
Acid brick, carbon black brick or carbon black block, firebrick grinding, plastics (with a gun)
and any resinous cement.

Fifty cents (\$0.50) per hour above scale shall be paid to employees working on free standing industrial or institutional chimneys which are completely detached from any building structure.

Prevailing Wage Rate Skilled Crafts

Name of Union: Bricklayer Local 18 Tile Finisher

Change # : LCN01-2019fbLoc18

Craft : Bricklayer Effective Date : 09/04/2019 Last Posted : 09/04/2019

| Classification | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|--|----------------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Bricklayer Tile Marble Terrazzo Finisher | \$24.69 | | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$39.51 | \$51.86 |
| Terrazzo Base Grinder | \$25.19 | | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.01 | \$52.61 |
| Marble Sander Polisher | \$24.79 | | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$39.61 | \$52.01 |
| Apprentices | Percent | | | | | | | | | | | |
| 1st 6 months 0-600 hrs | 60.00 | \$14.81 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$29.63 | \$37.04 |
| 2nd 6 months 601-1200 hrs | 65.00 | \$16.05 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$30.87 | \$38.89 |
| 3rd 6 months 1201-1800 hrs | 70.00 | \$17.28 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$32.10 | \$40.74 |
| 4th 6 months 1801-2400 hrs | 75.00 | \$18.52 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$33.34 | \$42.60 |
| 5th 6 months 2401-3000 hrs | 80.00 | \$19.75 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$34.57 | \$44.45 |
| 6th 6 months 3001-3600 | 90.00 | \$22.22 | \$9.22 | \$5.10 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.04 | \$48.15 |
| 1-30 Days Prior to Entering Apprenticeship | 50.00 | \$12.35 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$12.35 | \$18.52 |

Special Calculation Note : Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.

Note that the classification description is clarified after the local union number at the top of the page. **In order to utilize a Pre-Apprentice, you must have 1 Registered Apprentice in your employ.**

Ratio :

- 1 Journeyman to 1 Apprentice
- 5 Journeymen to 1 Apprentice
- 10 Journeymen to 2 Apprentices
- 15 Journeymen to 3 Apprentices
- 20 Journeymen to 4 Apprentices
- 25 Journeymen to 5 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

- ADAMS, BROWN, BUTLER, CLERMONT, GALLIA,
- HAMILTON, LAWRENCE, PREBLE*, SCIOTO,
- WARREN, WARREN*

Special Jurisdictional Note : Warren in the townships of Dixon, Gasper, Isrsel, Somers & Gratis in Preble County

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Bricklayer Local 18 Tile Mechanic

Change # : LCN01-2019fbLoc18

Craft : Bricklayer Effective Date : 09/04/2019 Last Posted : 09/04/2019

| Classification | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Bricklayer Tile Terrazzo Marble Mason Mechanic | \$29.24 | | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$44.10 | \$58.72 |
| Marble Layout Work | \$29.74 | | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$44.60 | \$59.47 |
| Swing Scaffold Worker | \$30.74 | | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$45.60 | \$60.97 |
| Apprentice after 2 years (2400 hrs) as Apprentice Finisher | | | | | | | | | | | | |
| 5th/6 Months 0-600 hrs. | 70.00 | \$20.47 | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.33 | \$45.56 |
| 6th/6 months 601-1200 hrs. | 75.00 | \$21.93 | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.79 | \$47.75 |
| 7th/6 months 1201-1800 hrs. | 80.00 | \$23.39 | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$38.25 | \$49.95 |
| 8th/6 months 1801-2400 hrs. | 90.00 | \$26.32 | \$9.22 | \$5.10 | \$0.54 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$41.18 | \$54.33 |

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

Ratio :

- 1 Journeyman to 1 Apprentice
- 5 Journeymen to 1 Apprentice
- 10 Journeymen to 2 Apprentices
- 15 Journeymen to 3 Apprentices
- 20 Journeymen to 4 Apprentices
- 25 Journeymen to 5 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, BROWN, BUTLER, CLERMONT, GALLIA,
HAMILTON, LAWRENCE, PREBLE*, SCIOTO, WARREN

Special Jurisdictional Note : In Preble County the Townships of Dixon, Israel, Gasper, Lanier, Somers and Gratis.

Details :

In order to utilize a Pre-Apprentice, you must have 1 Registered Apprentice in your employ.

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter & Pile Driver SW District HevHwy

Change # : LCN01-2018fbLoc126

Craft : Carpenter Effective Date : 06/13/2018 Last Posted : 06/13/2018

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Carpenter | \$29.87 | | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$46.59 | \$61.53 |
| Pile Driver | \$29.34 | | \$6.63 | \$6.95 | \$0.40 | \$0.00 | \$1.97 | \$0.10 | \$0.00 | \$0.00 | \$45.39 | \$60.06 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 6 Months | 60.00 | \$17.92 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$34.64 | \$43.60 |
| 2nd 6 Months is 1st year | 65.00 | \$19.42 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$36.14 | \$45.84 |
| 3rd 6 Months | 70.00 | \$20.91 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$37.63 | \$48.08 |
| 4th 6 Months is 2 years | 75.00 | \$22.40 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$39.12 | \$50.32 |
| 5th 6 Months | 80.00 | \$23.90 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$40.62 | \$52.56 |
| 6th 6 Months is 3 years | 85.00 | \$25.39 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$42.11 | \$54.80 |
| 7th 6 Months | 90.00 | \$26.88 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$43.60 | \$57.04 |
| 8th 6 Months is 4 years | 95.00 | \$28.38 | \$7.08 | \$6.95 | \$0.38 | \$0.00 | \$2.19 | \$0.12 | \$0.00 | \$0.00 | \$45.10 | \$59.28 |

Special Calculation Note : Other is UBC National Fund.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, DARKE, GREENE, HAMILTON, LOGAN, MIAMI, MONTGOMERY, PREBLE, SHELBY, WARREN

An employer shall have the right to employ one (1) Apprentice for one (1) Journeyman Carpenter in its employment for the first Apprentice employed, and 1 (1) Apprentice for two (2) Journeyman Carpenter for additional Apprentices employed. Thereafter, every third additional carpenter hired shall be an apprentice, if available, and if practical for the type of work being performed.

Special Jurisdictional Note :

Details :

Highway Construction, Airport Construction, Heavy Construction but not limited to:(tunnels,subways,drainage projects,flood control,reservoirs). Railroad Construction,Sewer Waterworks & Utility Construction but not limited to: (storm sewers, waterlines, gaslines). Industrial & Building Site, Power Plant, Amusement Park, Athletic Stadium Site, Sewer and Water Plants. When the Contractor furnishes the necessary underwater gear for the Diver, the Diver shall be paid one and one half (1&1/2) times the journeyman rate for the time spent in the water.

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter & Pile Driver
SW Zone 2

Change # : LCN01-2019fbLoc126

Craft : Carpenter Effective Date : 06/01/2019 Last Posted : 05/30/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|-----------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Carpenter | \$27.29 | | \$7.33 | \$6.95 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$43.52 | \$57.17 |
| Pile Driver | \$25.84 | | \$6.62 | \$6.95 | \$0.40 | \$0.00 | \$0.91 | \$0.10 | \$0.00 | \$0.00 | \$40.82 | \$53.74 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 3 Months | 60.00 | \$16.37 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$16.37 | \$24.56 |
| 2nd 3 Months | 60.00 | \$16.37 | \$7.33 | \$0.00 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$25.65 | \$33.84 |
| 2rd 6 Months | 60.00 | \$16.37 | \$7.33 | \$0.00 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$25.65 | \$33.84 |
| 3rd 6 Months | 65.00 | \$17.74 | \$7.33 | \$0.00 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$27.02 | \$35.89 |
| 4th 6 Months | 65.00 | \$17.74 | \$7.33 | \$0.00 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$27.02 | \$35.89 |
| 5th 6 Months | 70.00 | \$19.10 | \$7.33 | \$6.95 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$35.33 | \$44.88 |
| 6th 6 Months | 75.00 | \$20.47 | \$7.33 | \$6.95 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$36.70 | \$46.93 |
| 7th 6 Months | 80.00 | \$21.83 | \$7.33 | \$6.95 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$38.06 | \$48.98 |
| 8th 6 Months | 85.00 | \$23.20 | \$7.33 | \$6.95 | \$0.38 | \$0.00 | \$1.40 | \$0.17 | \$0.00 | \$0.00 | \$39.43 | \$51.02 |

Special Calculation Note : Other is for UBC National Fund.

Ratio :

- 1 Journeyman to 1 Apprentice
- 3 Journeyman to 1 Apprentice
- 5 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, CLINTON,
HAMILTON, WARREN

Special Jurisdictional Note :

Details :

Carpenter duties shall include but not limited to: Pile driving, milling, fashioning, joining, assembling, erecting, fastening, or dismantling of all material of

wood, plastic, metal, fiber, cork, and composition, and all other substitute materials: pile driving, cutting, fitting, and placing of lagging, and the handling, cleaning, erecting, installing, and dismantling of machinery, equipment, and erecting pre-engineered metal buildings.

Pile Drivers work but not limited to: unloading, assembling, erection, repairs, operation, signaling, dismantling, and reloading all equipment that is used for pile driving including pile butts. pile butts is defined as sheeting or scrap piling. Underwater work that may be required in connection with the installation of piling. The diver and his tender work as a team and shall arrive at their own financial arrangements with the contractor. Any configuration of wood, steel, concrete, or composite that is jetted, driven, or vibrated onto the ground by conventional pile driving equipment for the purpose of supporting a future load that may be permanent or temporary.

Driving bracing, plumbing, cutting off and capping of all piling whether wood, metal, pipe piling or composite. loading, unloading, erecting, framing, dismantling, moving, and handling of pile driving equipment. piling used in the construction and repair of all wharves, docks, piers, trestles, caissons, cofferdams, and the erection of all sea walls and breakwaters. All underwater and marine work on bulkheads, wharves, docks, shipyards, caissons, piers, bridges, pipeline work, viaducts, marine cable and trestles, as well as salvage and reclamation work where divers are employed.

Rate shall include carpenters, acoustic, and ceiling installers, drywall installers, pile drivers, and floorlayers.

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter Floorlayer SW District G

Change # : LCR01-2019fbLocSWDayton

Craft : Carpenter Effective Date : 10/16/2019 Last Posted : 10/16/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|----------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Carpenter Floorlayer | \$25.61 | | \$7.30 | \$6.95 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$41.98 | \$54.78 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 3 months | 60.00 | \$15.37 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$15.37 | \$23.05 |
| 2nd 3 months | 60.00 | \$15.37 | \$7.30 | \$0.00 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$24.79 | \$32.47 |
| 2nd 6 months | 60.00 | \$15.37 | \$7.30 | \$0.00 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$24.79 | \$32.47 |
| 3rd 6 months | 60.00 | \$15.37 | \$7.30 | \$0.00 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$24.79 | \$32.47 |
| 4th 6 months | 65.00 | \$16.65 | \$7.30 | \$0.00 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$26.07 | \$34.39 |
| 5th 6 months | 70.00 | \$17.93 | \$7.30 | \$6.95 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$34.30 | \$43.26 |
| 6th 6 months | 75.00 | \$19.21 | \$7.30 | \$6.95 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$35.58 | \$45.18 |
| 7th 6 months | 80.00 | \$20.49 | \$7.30 | \$6.95 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$36.86 | \$47.10 |
| 8th 6 months | 85.00 | \$21.77 | \$7.30 | \$6.95 | \$0.40 | \$0.00 | \$1.60 | \$0.12 | \$0.00 | \$0.00 | \$38.14 | \$49.02 |

Special Calculation Note : Other for \$0.12 is for UBC National Fund.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, DARKE, GREENE, HAMILTON, LOGAN, MIAMI, MONTGOMERY, PREBLE, SHELBY, WARREN

Special Jurisdictional Note :

Details :

Scope of work shall include, but not be limited to: receiving,unloading,handling,distribution and installation of all carpeting materials,carpet padding or matting materials and all resilient materials whether for use on walls, floors,counter, sink,table and all preparation work necessary in connection therewith, including sanding work. the installation of nonstructural under-layment and the work of removing, cleaning waxing of any of the above. Carpeting shall include any floor covering composed of either natural or synthetic fibers that are made in breadths to be sewed, fastened or directly glued to floors or over cushioning sound-proofing materials.Resilient Floors shall consist of and include the laying of all special designs of wood,wood block, wood composition, cork, linoleum, asphalt, mastic, plastic, rubber tile,whether nailed or glued.

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter Millwright Local 1090 SW Zone I

Change # : LCN01-2018fbLoc1066

Craft : Carpenter Effective Date : 10/17/2018 Last Posted : 10/17/2018

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|----------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|---------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Carpenter Millwright | \$30.48 | | \$7.17 | \$6.95 | \$0.44 | \$0.00 | \$6.36 | \$0.25 | \$0.00 | \$0.00 | \$51.65 | \$66.89 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 6 months | 60.00 | \$18.29 | \$7.17 | \$4.27 | \$0.44 | \$0.00 | \$3.82 | \$0.25 | \$0.00 | \$0.00 | \$34.24 | \$43.38 |
| 2nd 6 months | 65.00 | \$19.81 | \$7.17 | \$4.61 | \$0.44 | \$0.00 | \$4.13 | \$0.25 | \$0.00 | \$0.00 | \$36.41 | \$46.32 |
| 3rd 6 months | 70.00 | \$21.34 | \$7.17 | \$4.94 | \$0.44 | \$0.00 | \$4.45 | \$0.25 | \$0.00 | \$0.00 | \$38.59 | \$49.25 |
| 4th 6 months | 75.00 | \$22.86 | \$7.17 | \$5.28 | \$0.44 | \$0.00 | \$4.77 | \$0.25 | \$0.00 | \$0.00 | \$40.77 | \$52.20 |
| 5th 6 months | 80.00 | \$24.38 | \$7.17 | \$5.61 | \$0.44 | \$0.00 | \$5.09 | \$0.25 | \$0.00 | \$0.00 | \$42.94 | \$55.14 |
| 6th 6 months | 85.00 | \$25.91 | \$7.17 | \$5.95 | \$0.44 | \$0.00 | \$5.41 | \$0.25 | \$0.00 | \$0.00 | \$45.13 | \$58.08 |
| 7th 6 months | 90.00 | \$27.43 | \$7.17 | \$6.28 | \$0.44 | \$0.00 | \$5.72 | \$0.25 | \$0.00 | \$0.00 | \$47.29 | \$61.01 |
| 8th 6 months | 95.00 | \$28.96 | \$7.17 | \$6.62 | \$0.44 | \$0.00 | \$6.04 | \$0.25 | \$0.00 | \$0.00 | \$49.48 | \$63.95 |

Special Calculation Note : Other (\$0.25) \$0.10 National Fund, \$0.10. Drug Safety Program \$0.10 and National Millwright Fund \$0.05

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, CLINTON,
HAMILTON, WARREN

Special Jurisdictional Note :

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter NE District Industrial Dock & Door

Change # : LCN01-2014fbCarpNEStatewide

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

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

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

Ratio :

1 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

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

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

Details :

10/27/10 New Contract jc

Prevailing Wage Rate Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 Hwy A

Change # : LCN01-2019fbHvyHwy

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

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Cement Mason Bricklayer Sewer Water Works A | \$29.34 | | \$9.25 | \$6.41 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$45.45 | \$60.12 |
| Apprentice | | | | | | | | | | | | |
| | Percent | | | | | | | | | | | |
| 1st year | 50.00 | \$14.67 | \$9.25 | \$6.41 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$30.78 | \$38.12 |
| 2nd year | 70.00 | \$20.54 | \$9.25 | \$6.41 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.65 | \$46.92 |
| 3rd year | 90.00 | \$26.41 | \$9.25 | \$6.41 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$42.52 | \$55.72 |

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

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

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note :

Details :

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

Prevailing Wage Rate Skilled Crafts

Name of Union: Cement Mason Bricklayer Local 97 HevHwy B

Change # : LCN01-2019fbHvyHwy

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

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Cement Mason Bricklayer Power Plants Tunnels Amusement Parks B | \$30.33 | | \$9.25 | \$6.41 | \$0.46 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$46.45 | \$61.62 |
| Apprentice | | | | | | | | | | | | |
| | Percent | | | | | | | | | | | |
| 1st year | 50.00 | \$15.16 | \$9.25 | \$6.41 | \$0.46 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.28 | \$38.87 |
| 2nd year | 70.00 | \$21.23 | \$9.25 | \$6.41 | \$0.46 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.35 | \$47.97 |
| 3rd year | 90.00 | \$27.30 | \$9.25 | \$6.41 | \$0.46 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.42 | \$57.07 |

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

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

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note :

Details :

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

Prevailing Wage Rate Skilled Crafts

Name of Union: Cement Mason Local 132 (Cincinnati)

Change # : LCN01-2019fbLoc132

Craft : Cement Effective Date : 06/05/2019 Last Posted : 06/05/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|----------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Cement Mason | \$24.50 | | \$6.70 | \$6.50 | \$0.60 | \$0.00 | \$0.80 | \$0.00 | \$0.00 | \$0.00 | \$39.10 | \$51.35 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st yr | 70.00 | \$17.15 | \$6.70 | \$6.50 | \$0.60 | \$0.00 | \$0.80 | \$0.00 | \$0.00 | \$0.00 | \$31.75 | \$40.32 |
| 2nd yr | 80.00 | \$19.60 | \$6.70 | \$6.50 | \$0.60 | \$0.00 | \$0.80 | \$0.00 | \$0.00 | \$0.00 | \$34.20 | \$44.00 |
| 3rd yr | 90.00 | \$22.05 | \$6.70 | \$6.50 | \$0.60 | \$0.00 | \$0.80 | \$0.00 | \$0.00 | \$0.00 | \$36.65 | \$47.68 |

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

Ratio :

- 1 Journeymen to 1 Apprentice
- 4 Journeymen to 2 Apprentice
- 7 Journeymen to 3 Apprentice
- 10 Journeymen to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, HAMILTON,
HIGHLAND, WARREN

Special Jurisdictional Note :

Details :

- *Cement Masons working on silo & slip form work shall receive \$.50 per hour over Journeyman scale.
- *Cement Masons working on swinging scaffolds shall receive \$.50 per hour over Journeyman scale.
- *Cement Masons working on high lifts from 20' and above shall receive \$.50 per hour over Journeyman scale.

Prevailing Wage Rate Skilled Crafts

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

Change # : OCN01-2019fbCementHwy

Craft : Cement Mason Effective Date : 07/31/2019 Last Posted : 07/31/2019

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|---------------------------|---------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Cement Mason | \$29.36 | | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$47.22 | \$61.90 |
| Apprentice Percent | | | | | | | | | | | | |
| 1st Year | 70.00 | \$20.55 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$38.41 | \$48.69 |
| 2nd Year | 80.00 | \$23.49 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$41.35 | \$53.09 |
| 3rd Year | 90.00 | \$26.42 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$44.28 | \$57.50 |

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

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, COLUMBIANA, DEFIANCE, ERIE, HAMILTON, HIGHLAND, HURON, LORAIN, MAHONING, MEDINA, OTTAWA, PAULDING, PORTAGE, SANDUSKY, SENECA, STARK, SUMMIT, TRUMBULL, WARREN, WILLIAMS

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

Details :

Prevailing Wage Rate Skilled Crafts

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

Change # : OCN01-2019fbCementHevHwy

Craft : Cement Mason Effective Date : 07/31/2019 Last Posted : 07/31/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Cement Mason | \$30.23 | | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$48.09 | \$63.21 |
| Apprentice Percent | | | | | | | | | | | | |
| 1st Year | 70.00 | \$21.16 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$39.02 | \$49.60 |
| 2nd Year | 80.00 | \$24.18 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$42.04 | \$54.14 |
| 3rd Year | 90.00 | \$27.21 | \$8.00 | \$6.90 | \$0.71 | \$0.00 | \$2.25 | \$0.00 | \$0.00 | \$0.00 | \$45.07 | \$58.67 |

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

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, COLUMBIANA, DEFIANCE, ERIE, HAMILTON, HIGHLAND, HURON, LORAIN, MAHONING, MEDINA, OTTAWA, PAULDING, PORTAGE, SANDUSKY, SENECA, STARK, SUMMIT, TRUMBULL, WARREN, WILLIAMS

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

Details :

Prevailing Wage Rate Skilled Crafts

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

Change # : LCN01-2019fbLoc7

Craft : Lineman Effective Date : 04/24/2019 Last Posted : 04/24/2019

| Classification | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---------------------------------|----------------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|---------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | | |
| | | | | | | | | | | | | |
| Electrical Lineman | \$43.48 | \$6.00 | \$1.30 | \$0.43 | \$0.00 | \$10.00 | \$0.35 | \$0.00 | \$0.00 | \$61.56 | \$83.30 | |
| Certified Lineman Welder | \$43.48 | \$6.00 | \$1.30 | \$0.43 | \$0.00 | \$10.00 | \$0.35 | \$0.00 | \$0.00 | \$61.56 | \$83.30 | |
| Certified Cable Splicer | \$43.48 | \$6.00 | \$1.30 | \$0.43 | \$0.00 | \$10.00 | \$0.35 | \$0.00 | \$0.00 | \$61.56 | \$83.30 | |
| Operator A | \$39.02 | \$6.00 | \$1.17 | \$0.39 | \$0.00 | \$8.97 | \$0.35 | \$0.00 | \$0.00 | \$55.90 | \$75.41 | |
| Operator B | \$34.60 | \$6.00 | \$1.04 | \$0.35 | \$0.00 | \$7.96 | \$0.35 | \$0.00 | \$0.00 | \$50.30 | \$67.60 | |
| Operator C | \$27.93 | \$6.00 | \$0.84 | \$0.28 | \$0.00 | \$6.42 | \$0.35 | \$0.00 | \$0.00 | \$41.82 | \$55.79 | |
| Groundman 0-12 months Exp | \$21.74 | \$6.00 | \$0.65 | \$0.22 | \$0.00 | \$5.00 | \$0.35 | \$0.00 | \$0.00 | \$33.96 | \$44.83 | |
| Groundman 0-12 months Exp w/CDL | \$23.91 | \$6.00 | \$0.72 | \$0.24 | \$0.00 | \$5.50 | \$0.35 | \$0.00 | \$0.00 | \$36.72 | \$48.68 | |
| Groundman 1 yr or more | \$23.91 | \$6.00 | \$0.72 | \$0.24 | \$0.00 | \$5.50 | \$0.35 | \$0.00 | \$0.00 | \$36.72 | \$48.68 | |
| Groundman 1 yr or more w/CDL | \$28.26 | \$6.00 | \$0.85 | \$0.28 | \$0.00 | \$6.50 | \$0.35 | \$0.00 | \$0.00 | \$42.24 | \$56.37 | |
| Equipment Mechanic A | \$34.60 | \$6.00 | \$1.04 | \$0.35 | \$0.00 | \$7.96 | \$0.35 | \$0.00 | \$0.00 | \$50.30 | \$67.60 | |
| Equipment Mechanic B | \$31.26 | \$6.00 | \$0.94 | \$0.31 | \$0.00 | \$7.19 | \$0.35 | \$0.00 | \$0.00 | \$46.05 | \$61.68 | |
| Equipment Mechanic C | \$27.93 | \$6.00 | \$0.84 | \$0.28 | \$0.00 | \$6.42 | \$0.35 | \$0.00 | \$0.00 | \$41.82 | \$55.79 | |
| X-Ray Technician | \$43.48 | \$6.00 | \$1.30 | \$0.43 | \$0.00 | \$10.00 | \$0.35 | \$0.00 | \$0.00 | \$61.56 | \$83.30 | |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 1000 hrs | 60.00 | \$26.09 | \$6.00 | \$0.78 | \$0.26 | \$0.00 | \$6.00 | \$0.35 | \$0.00 | \$0.00 | \$39.48 | \$52.52 |

| | | | | | | | | | | | | |
|--------------|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| 2nd 1000 hrs | 65.00 | \$28.26 | \$6.00 | \$0.85 | \$0.28 | \$0.00 | \$6.50 | \$0.35 | \$0.00 | \$0.00 | \$42.24 | \$56.37 |
| 3rd 1000 hrs | 70.00 | \$30.44 | \$6.00 | \$0.91 | \$0.30 | \$0.00 | \$7.00 | \$0.35 | \$0.00 | \$0.00 | \$45.00 | \$60.21 |
| 4th 1000 hrs | 75.00 | \$32.61 | \$6.00 | \$0.98 | \$0.33 | \$0.00 | \$7.50 | \$0.35 | \$0.00 | \$0.00 | \$47.77 | \$64.07 |
| 5th 1000 hrs | 80.00 | \$34.78 | \$6.00 | \$1.04 | \$0.35 | \$0.00 | \$8.00 | \$0.35 | \$0.00 | \$0.00 | \$50.52 | \$67.92 |
| 6th 1000 hrs | 85.00 | \$36.96 | \$6.00 | \$1.11 | \$0.37 | \$0.00 | \$8.50 | \$0.35 | \$0.00 | \$0.00 | \$53.29 | \$71.77 |
| 7th 1000 hrs | 90.00 | \$39.13 | \$6.00 | \$1.17 | \$0.39 | \$0.00 | \$9.00 | \$0.35 | \$0.00 | \$0.00 | \$56.04 | \$75.61 |

Special Calculation Note : Other is Health Retirement Account

Operator "A"

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

Operator "B"

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

Operator "C"

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

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

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note :

Details :

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

| | | | | | | | | | | | | |
|-----------------|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| 1st 1,000 Hours | 60.00 | \$22.96 | \$6.00 | \$0.69 | \$0.23 | \$0.00 | \$4.13 | \$0.06 | \$0.00 | \$0.00 | \$34.07 | \$45.55 |
| 2nd 1,000 Hours | 65.00 | \$24.88 | \$6.00 | \$0.75 | \$0.25 | \$0.00 | \$4.48 | \$0.06 | \$0.00 | \$0.00 | \$36.42 | \$48.85 |
| 3rd 1,000 Hours | 70.00 | \$26.79 | \$6.00 | \$0.80 | \$0.27 | \$0.00 | \$4.82 | \$0.06 | \$0.00 | \$0.00 | \$38.74 | \$52.13 |
| 4th 1,000 Hours | 75.00 | \$28.70 | \$6.00 | \$0.86 | \$0.29 | \$0.00 | \$5.17 | \$0.06 | \$0.00 | \$0.00 | \$41.08 | \$55.43 |
| 5th 1,000 Hours | 80.00 | \$30.62 | \$6.00 | \$0.92 | \$0.31 | \$0.00 | \$5.51 | \$0.06 | \$0.00 | \$0.00 | \$43.42 | \$58.72 |
| 6th 1,000 Hours | 85.00 | \$32.53 | \$6.00 | \$0.98 | \$0.33 | \$0.00 | \$5.86 | \$0.06 | \$0.00 | \$0.00 | \$45.76 | \$62.02 |
| 7th 1,000 Hours | 90.00 | \$34.44 | \$6.00 | \$1.03 | \$0.34 | \$0.00 | \$6.20 | \$0.06 | \$0.00 | \$0.00 | \$48.07 | \$65.29 |

Special Calculation Note : Other is Safety & Education Fund.

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, HAMILTON, WARREN

Special Jurisdictional Note :

Details :

A groundman when directed shall assist a Journeyman in the performance of his/her work on the ground, including the use of hand tools. A Groundman under no circumstances shall climb poles, towers, ladders, or work from an elevated platform or bucket truck.

No more than three (3) Groundmen shall work alone. Jobs with more than three Groundmen shall be supervised by a Groundcrew Foreman, Journeyman Lineman, Journeyman Traffic Signal Technician or an Equipment Operator.

Scope of Work: installation and maintenance of highway and street lighting, highway and street sign lighting, electronic message boards and traffic control systems, camera systems, traffic signal work, substation and line construction including overhead and underground projects for private and industrial work as in accordance with the IBEW Constitution. This Agreement includes the operation of all tools and equipment necessary for the installation of the above projects.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 71 Outside Utility Power

Change # : LCN01-2019fbLoc7

Craft : Lineman Effective Date : 04/24/2019 Last Posted : 04/24/2019

| Classification | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|---------------------------------|----------------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Electrical Lineman | \$41.22 | \$6.00 | \$1.24 | \$0.41 | \$0.00 | \$9.48 | \$0.35 | \$0.00 | \$0.00 | \$58.70 | \$79.31 |
| Substation Technician | \$41.22 | \$6.00 | \$1.24 | \$0.41 | \$0.00 | \$9.48 | \$0.35 | \$0.00 | \$0.00 | \$58.70 | \$79.31 |
| Cable Splicer | \$43.14 | \$6.00 | \$1.29 | \$0.43 | \$0.00 | \$9.92 | \$0.35 | \$0.00 | \$0.00 | \$61.13 | \$82.70 |
| Operator A | \$37.00 | \$6.00 | \$1.11 | \$0.37 | \$0.00 | \$8.51 | \$0.35 | \$0.00 | \$0.00 | \$53.34 | \$71.84 |
| Operator B | \$32.78 | \$6.00 | \$0.98 | \$0.33 | \$0.00 | \$7.54 | \$0.35 | \$0.00 | \$0.00 | \$47.98 | \$64.37 |
| Operator C | \$26.44 | \$6.00 | \$0.79 | \$0.26 | \$0.00 | \$6.08 | \$0.35 | \$0.00 | \$0.00 | \$39.92 | \$53.14 |
| Groundman 0-12 months Exp | \$20.61 | \$6.00 | \$0.62 | \$0.21 | \$0.00 | \$4.74 | \$0.35 | \$0.00 | \$0.00 | \$32.53 | \$42.84 |
| Groundman 0-12 months Exp w/CDL | \$22.67 | \$6.00 | \$0.68 | \$0.23 | \$0.00 | \$5.21 | \$0.35 | \$0.00 | \$0.00 | \$35.14 | \$46.48 |
| Groundman 1 yr or more | \$22.67 | \$6.00 | \$0.68 | \$0.23 | \$0.00 | \$5.21 | \$0.35 | \$0.00 | \$0.00 | \$35.14 | \$46.48 |
| Groundman 1 yr or more w/CDL | \$26.80 | \$6.00 | \$0.80 | \$0.27 | \$0.00 | \$6.16 | \$0.35 | \$0.00 | \$0.00 | \$40.38 | \$53.78 |
| Equipment Mechanic A | \$32.78 | \$6.00 | \$0.98 | \$0.33 | \$0.00 | \$7.54 | \$0.35 | \$0.00 | \$0.00 | \$47.98 | \$64.37 |
| Equipment Mechanic B | \$29.62 | \$6.00 | \$0.89 | \$0.30 | \$0.00 | \$6.81 | \$0.35 | \$0.00 | \$0.00 | \$43.97 | \$58.78 |
| Equipment Mechanic C | \$26.44 | \$6.00 | \$0.79 | \$0.26 | \$0.00 | \$6.08 | \$0.35 | \$0.00 | \$0.00 | \$39.92 | \$53.14 |
| Line Truck w/uuger | \$29.17 | \$6.00 | \$0.88 | \$0.29 | \$0.00 | \$6.71 | \$0.35 | \$0.00 | \$0.00 | \$43.40 | \$57.99 |
| Apprentice | Percent | | | | | | | | | | |
| 1st 1000 hrs | 60.00 | \$24.73 | \$6.00 | \$0.74 | \$0.25 | \$5.69 | \$0.35 | \$0.00 | \$0.00 | \$37.76 | \$50.13 |

| | | | | | | | | | | | | |
|--------------|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| 2nd 1000 hrs | 65.00 | \$26.79 | \$6.00 | \$0.80 | \$0.27 | \$0.00 | \$6.16 | \$0.35 | \$0.00 | \$0.00 | \$40.37 | \$53.77 |
| 3rd 1000 hrs | 70.00 | \$28.85 | \$6.00 | \$0.87 | \$0.29 | \$0.00 | \$6.64 | \$0.35 | \$0.00 | \$0.00 | \$43.00 | \$57.43 |
| 4th 1000 hrs | 75.00 | \$30.91 | \$6.00 | \$0.93 | \$0.31 | \$0.00 | \$7.11 | \$0.35 | \$0.00 | \$0.00 | \$45.62 | \$61.07 |
| 5th 1000 hrs | 80.00 | \$32.98 | \$6.00 | \$0.99 | \$0.33 | \$0.00 | \$7.59 | \$0.35 | \$0.00 | \$0.00 | \$48.24 | \$64.72 |
| 6th 1000 hrs | 85.00 | \$35.04 | \$6.00 | \$1.05 | \$0.35 | \$0.00 | \$8.06 | \$0.35 | \$0.00 | \$0.00 | \$50.85 | \$68.37 |
| 7th 1000 hrs | 90.00 | \$37.10 | \$6.00 | \$1.11 | \$0.37 | \$0.00 | \$8.53 | \$0.35 | \$0.00 | \$0.00 | \$53.46 | \$72.01 |

Special Calculation Note : Other is Health Retirement Account

Operator "A"

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

Operator "B"

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

Operator "C"

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

Ratio :

(1) Journeyman Lineman to (1) Apprentice

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note : 0.30 is for Health Retirement Account.

Details :

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

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 71 Voice Data Video Outside

Change # : LCR01-2017fbLoc71VDV

Craft : Voice Data Video Effective Date : 10/18/2017 Last Posted : 10/18/2017

| | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|-----------------------------------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | |
| Electrical Installer Technician I | \$23.46 | \$5.50 | \$0.70 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$29.96 | \$41.69 |
| Installer Technician II | \$22.37 | \$5.50 | \$0.67 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$28.84 | \$40.03 |
| Equipment Operator I | \$22.37 | \$5.50 | \$0.67 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$28.84 | \$40.03 |
| Equipment Operator II | \$18.43 | \$5.50 | \$0.55 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$24.78 | \$33.99 |
| Installer /Repair Outside | \$22.37 | \$5.50 | \$0.67 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$28.84 | \$40.03 |
| Ground Driver W/CDL | \$15.83 | \$5.50 | \$0.47 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$22.10 | \$30.01 |
| Groundman | \$13.24 | \$5.50 | \$0.40 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$19.44 | \$26.06 |
| Cable Splicer | \$23.46 | \$5.50 | \$0.70 | \$0.00 | \$0.00 | \$0.30 | \$0.00 | \$0.00 | \$0.00 | \$29.96 | \$41.69 |

Special Calculation Note :

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

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

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

Special Jurisdictional Note :

Details :

Cable Splicer: Inspect and test lines or cables, analyze results, and evaluate transmission characteristics. Cover conductors with insulation or seal splices with moisture-proof covering. Install, splice, test, and repair cables using tools or mechanical equipment. This will include the splicing of fiber.

Journeyman Technician I: Must know all aspects of telephone and cable work. This is to include aerial, underground, and manhole work. Must know how to climb and run bucket. Must have all the tools required to perform these tasks. Must be able to be responsible for the safety of the crew at all times. Must also have CDL license and have at least 5 years experience.

Installer/Repairman: Perform tasks of repairing, installing, and testing phone and CATV services.

Technician II: Have at least three years of telephone and CATV experience. Must have the knowledge of underground, aerial, and manhole work. Must be able to climb and operate bucket. Must have CDL. Must have all tools needed to perform these tasks.

Equipment Operator I: Able to operate a digger derrick or bucket truck. Have at least 5 years of experience and must have a valid CDL license.

Equipment Operator II: Able to operate a digger derrick or bucket truck. Have at least 3 years of experience and must have a valid CDL license.

Groundman W/CDL: Must have a valid CDL license and be able to perform tasks such as: climbing poles, pulling downguys, making up material, and getting appropriate tools for the job. Must have at least 5 year's experience.

Groundman: Perform tasks such as: climbing poles, pulling downguys, making up material, and getting appropriate tools for the job. Experience 0-5 years.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 82 Inside

Change # : LCN02-2019fbLoc82in

Craft : Electrical Effective Date : 12/18/2019 Last Posted : 12/18/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Electrician | \$31.15 | | \$7.20 | \$9.03 | \$0.53 | \$0.00 | \$3.20 | \$0.00 | \$0.00 | \$0.00 | \$51.11 | \$66.68 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st period 0 - 1000 hrs | 42.00 | \$13.08 | \$3.82 | \$0.59 | \$0.22 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$17.71 | \$24.25 |
| 2nd period 1001-2000 hrs | 42.00 | \$13.08 | \$3.82 | \$0.59 | \$0.22 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$17.71 | \$24.25 |
| 3rd period 2001-3500 hrs | 47.00 | \$14.64 | \$6.67 | \$4.25 | \$0.25 | \$0.00 | \$1.50 | \$0.00 | \$0.00 | \$0.00 | \$27.31 | \$34.63 |
| 4th period 3501-5000 hrs | 52.00 | \$16.20 | \$6.72 | \$4.70 | \$0.28 | \$0.00 | \$1.66 | \$0.00 | \$0.00 | \$0.00 | \$29.56 | \$37.66 |
| 5th period 5001-6500 hrs | 62.00 | \$19.31 | \$6.82 | \$5.60 | \$0.33 | \$0.00 | \$1.98 | \$0.00 | \$0.00 | \$0.00 | \$34.04 | \$43.70 |
| 6th period 6501-8000 hrs | 75.00 | \$23.36 | \$7.20 | \$6.78 | \$0.40 | \$0.00 | \$2.40 | \$0.00 | \$0.00 | \$0.00 | \$40.14 | \$51.82 |

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

Ratio :

1 to 3 Journeymen to 3 Apprentices
4 to 6 Journeymen to 6 Apprentices
per job site

Jurisdiction (* denotes special jurisdictional note) :

CLINTON, DARKE, GREENE, MIAMI,
MONTGOMERY, PREBLE, WARREN*

Special Jurisdictional Note : The following townships in Warren County are included: Clearcreek, Franklin and Wayne.

Details :

Only correction made on 6-19-19 was the 5th year Apprentice fb.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 82 Inside Lt Commercial South West

Change # : LCNO1-2019fbLoc82in

Craft : Electrical Effective Date : 09/19/2019 Last Posted : 09/19/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|---------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Electrician | \$30.15 | | \$5.95 | \$8.75 | \$0.66 | \$0.00 | \$2.45 | \$0.00 | \$0.00 | \$0.00 | \$47.96 | \$63.03 |
| CE-3 12,001-14,000 | \$21.89 | | \$5.95 | \$0.66 | \$0.66 | \$0.00 | \$0.62 | \$0.00 | \$0.00 | \$0.10 | \$29.88 | \$40.82 |
| CE-2 10,001-12,000 Hrs | \$17.20 | | \$5.95 | \$0.52 | \$0.66 | \$0.00 | \$0.49 | \$0.00 | \$0.00 | \$0.10 | \$24.92 | \$33.52 |
| CE-1 8,001-10,000 Hrs | \$15.64 | | \$5.95 | \$0.47 | \$0.66 | \$0.00 | \$0.44 | \$0.00 | \$0.00 | \$0.10 | \$23.26 | \$31.08 |
| CW-4 6,001-8,000 Hrs | \$14.07 | | \$5.95 | \$0.42 | \$0.66 | \$0.00 | \$0.40 | \$0.00 | \$0.00 | \$0.10 | \$21.60 | \$28.64 |
| CW-3 4,001-6,000 Hrs | \$12.51 | | \$5.95 | \$0.38 | \$0.66 | \$0.00 | \$0.35 | \$0.00 | \$0.00 | \$0.10 | \$19.95 | \$26.21 |
| CW-2 2,001-4,000 Hrs | \$11.73 | | \$5.95 | \$0.35 | \$0.66 | \$0.00 | \$0.31 | \$0.00 | \$0.00 | \$0.10 | \$19.10 | \$24.96 |
| CW-1 0-2,000 Hrs | \$10.94 | | \$5.95 | \$0.33 | \$0.66 | \$0.00 | \$0.31 | \$0.00 | \$0.00 | \$0.10 | \$18.29 | \$23.76 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st period 0 - 1000 hrs | 42.00 | \$12.66 | \$3.42 | \$0.20 | \$0.22 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$16.50 | \$22.83 |
| 2nd period 1001-2000 hrs | 42.00 | \$12.66 | \$3.42 | \$0.20 | \$0.22 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$16.50 | \$22.83 |
| 3rd period 2001-3500 hrs | 47.00 | \$14.17 | \$6.27 | \$3.69 | \$0.24 | \$0.00 | \$1.50 | \$0.00 | \$0.00 | \$0.00 | \$25.87 | \$32.96 |
| 4th period 3501-5000 hrs | 52.00 | \$15.68 | \$6.32 | \$4.08 | \$0.27 | \$0.00 | \$1.65 | \$0.00 | \$0.00 | \$0.00 | \$28.00 | \$35.84 |
| 5th period 5001-6500 hrs | 62.00 | \$18.69 | \$6.42 | \$4.87 | \$0.32 | \$0.00 | \$1.96 | \$0.00 | \$0.00 | \$0.00 | \$32.26 | \$41.61 |
| 6th period 6501-8000 hrs | 75.00 | \$22.61 | \$6.80 | \$5.89 | \$0.38 | \$0.00 | \$2.40 | \$0.00 | \$0.00 | \$0.00 | \$38.08 | \$49.39 |

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

Ratio :

1 to 3 Journeymen to 3 Apprentices
4 to 6 Journeymen to 6 Apprentices
per job site

Jurisdiction (* denotes special jurisdictional note) :

CLINTON, DARKE, GREENE, MIAMI,
MONTGOMERY, PREBLE, WARREN*

Construction Electrician and Construction Wireman Ratio

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

Special Jurisdictional Note : The following townships in Warren County are included: Clearcreek, Franklin and Wayne.

The scope of work for the light commercial agreement shall apply to the following facilities not to exceed 200,000 square feet; office buildings, shopping centers, auto sales agencies and garages, churches, funeral homes, nursing homes, hotels, retail and wholesale facilities, small stand-alone manufacturing facilities when free standing and not part of a larger facility (not to exceed 50,000 square fee), solar projects (500 panels or less) unless otherwise covered under the agreement, lighting retrofits (when not associated with remodels involving branch re-circuiting) lighting retrofits shall be defined as the changing of lamps and ballasts in existing light fixtures and shall also include the one for one replacement of existing fixtures, warehouses, gas stations, food service centers, restaurants, entertainment facilities, hospitals, clinics, motels, residential buildings.

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 82 Lightning Rod

Change # : LCR01-2019fbLoc82

Craft : Electrical Effective Date : 12/11/2019 Last Posted : 12/11/2019

| | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|------------------------------------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | |
| Electrical Lightning Rod Technican | \$29.79 | \$7.20 | \$8.99 | \$0.00 | \$0.00 | \$3.20 | \$0.00 | \$0.00 | \$0.00 | \$49.18 | \$64.07 |
| | | | | | | | | | | | |

Special Calculation Note : No Apprentice approved by OSAC.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
CLINTON, DARKE, GREENE, MIAMI,
MONTGOMERY, PREBLE, WARREN*

Special Jurisdictional Note : The following townships in Warren County are included: (Clearcreek, Franklin and Wayne)

Details :

| After 09-04-2018 | | | | | | | | | | | | | |
|---------------------|-------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|
| 1st 0-1000 hours | 55.00 | \$13.39 | \$3.00 | \$0.40 | \$0.25 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$17.29 | \$23.99 |
| 2nd 1001-2000 hours | 55.00 | \$13.39 | \$3.00 | \$0.40 | \$0.25 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$17.29 | \$23.99 |
| 3rd 2001-3000 hours | 65.00 | \$15.83 | \$6.40 | \$0.47 | \$0.30 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$27.40 | \$35.31 |
| 4th 3001-4000 hours | 65.00 | \$15.83 | \$6.40 | \$0.47 | \$0.30 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$27.40 | \$35.31 |
| 5th 4001-5000 hours | 75.00 | \$18.26 | \$6.43 | \$0.55 | \$0.35 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$29.99 | \$39.12 |
| 6th 5001-6000 hours | 75.00 | \$18.26 | \$6.43 | \$0.55 | \$0.35 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$29.99 | \$39.12 |
| 7th 6001-7000 hours | 80.00 | \$19.48 | \$6.44 | \$0.58 | \$0.37 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.27 | \$41.01 |
| 8th 7001 hours | 80.00 | \$19.48 | \$6.44 | \$0.58 | \$0.37 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.27 | \$41.01 |
| Cable Puller | 50.00 | \$12.18 | \$3.00 | \$0.37 | \$0.23 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$16.02 | \$22.11 |

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

Ratio :

1 Journeymen to 2 Apprentice
(Indentured After 9-4-2018)

1 Journeymen to 1 Apprentice
(Indentured Before 9--03-2018)

Jurisdiction (* denotes special jurisdictional note) :

CLINTON, DARKE, GREENE, MIAMI,
MONTGOMERY, PREBLE, WARREN*

Special Jurisdictional Note : The following townships in Warren County are included: (Clearcreek, Franklin and Wayne)

Details :

Work covered but not limited to: installation which utilize transmission and/or transference of voice, sound, vision or digital for commercial, education, security and entertainment purposes for the following:

TV monitoring and surveillance, background-foreground music, intercom and telephone interconnect, inventory control systems, microwave transmission, multimedia, multiplex, nurse call system, radio page, school intercom, sound and low voltage master clock systems.

Fire Alarm work is excluded on all new construction sites or wherever the fire alarm system is installed in conduit.

All HVAC control work is not covered by this wage rate but by the Inside Electrical wage rate.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 648 Inside

Change # : LCN01-2019fbLoc648in

Craft : Electrical Effective Date : 09/11/2019 Last Posted : 09/11/2019

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|---------------------------------|---------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Electrician | \$30.00 | | \$7.10 | \$8.90 | \$0.45 | \$0.00 | \$2.50 | \$0.90 | \$0.00 | \$0.00 | \$49.85 | \$64.85 |
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| | | | | | | | | | | | | |
| Apprentice | Percent | | | | | | | | | | | |
| 1st period 0-1000 hrs | 45.00 | \$13.50 | \$4.07 | \$0.00 | \$0.20 | \$0.00 | \$2.50 | \$0.41 | \$0.00 | \$0.00 | \$20.68 | \$27.43 |
| 2nd period 1001- 2000 hrs | 45.00 | \$13.50 | \$4.07 | \$0.00 | \$0.20 | \$0.00 | \$2.50 | \$0.41 | \$0.00 | \$0.00 | \$20.68 | \$27.43 |
| 3rd period 2001- 3500 hrs | 50.00 | \$15.00 | \$7.10 | \$4.45 | \$0.23 | \$0.00 | \$2.50 | \$0.45 | \$0.00 | \$0.00 | \$29.73 | \$37.23 |
| 4th period 3501- 5000 hrs | 55.00 | \$16.50 | \$7.10 | \$4.90 | \$0.25 | \$0.00 | \$2.50 | \$0.50 | \$0.00 | \$0.00 | \$31.75 | \$40.00 |
| 5th period 5001- 6500 hrs | 62.00 | \$18.60 | \$7.10 | \$5.52 | \$0.28 | \$0.00 | \$2.50 | \$0.56 | \$0.00 | \$0.00 | \$34.56 | \$43.86 |
| 6th period 6501- 8000 hrs | 71.00 | \$21.30 | \$7.10 | \$6.32 | \$0.32 | \$0.00 | \$2.50 | \$0.64 | \$0.00 | \$0.00 | \$38.18 | \$48.83 |

Special Calculation Note : Other is NEBF (National Electrical Benefit Fund.)

Ratio :

3 Journeyman to 2 Apprentices or fraction thereof:
 1-3 Journeymen to 2 Apprentice
 4-6 Journeymen to 4 Apprentice
 7-9 Journeymen to 6 Apprentice
 first person assigned to any job site shall be a journeyman

Jurisdiction (* denotes special jurisdictional note) :

BUTLER, WARREN*

Special Jurisdictional Note : In Warren County the following townships are included: (Deerfield, Hamilton, Harlan, Massie, Salem, Turtle Creek, Union, and Washington)

Details :

Electricians while splicing cable shall receive \$.50 an hour above the regular electrical rate.

All work that requires the use of gas masks or respirators, shall be paid 50% above the appropriate rate of pay. Work up to & including 40 feet shall be paid \$.50 over the journeyman rate. All work from a Boatswain Chair, Swinging Scaffold, or Barrel shall be at double the Journeyman rate. Workmen required to work 50 feet or more below the surface of the earth will be paid 50% above the Journeyman rate.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 648 Lt Commercial South West

Change # : LCN01-2019fbLoc648in

Craft : Electrical Effective Date : 12/24/2019 Last Posted : 12/24/2019

| Classification | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Electrician | \$30.00 | | \$7.10 | \$8.90 | \$0.45 | \$0.00 | \$2.50 | \$0.90 | \$0.00 | \$0.00 | \$49.85 | \$64.85 |
| CE-3 12,001-14,000 Hrs | \$22.45 | | \$6.15 | \$0.67 | \$0.67 | \$0.00 | \$0.67 | \$0.00 | \$0.00 | \$0.00 | \$30.61 | \$41.84 |
| CE-2 10,001-12,000 Hrs | \$17.64 | | \$6.15 | \$0.53 | \$0.67 | \$0.00 | \$0.53 | \$0.00 | \$0.00 | \$0.00 | \$25.52 | \$34.34 |
| CE-1 8,001-10,000 Hrs | \$16.04 | | \$6.15 | \$0.48 | \$0.67 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$0.00 | \$23.82 | \$31.84 |
| CW-4 6,001-8,000 Hrs | \$14.43 | | \$6.15 | \$0.43 | \$0.67 | \$0.00 | \$0.43 | \$0.00 | \$0.00 | \$0.00 | \$22.11 | \$29.33 |
| CW-3 4,001-6,000 Hrs | \$12.83 | | \$6.15 | \$0.38 | \$0.67 | \$0.00 | \$0.38 | \$0.00 | \$0.00 | \$0.00 | \$20.41 | \$26.83 |
| CW-2 2,001-4,000 Hrs | \$12.03 | | \$6.15 | \$0.36 | \$0.67 | \$0.00 | \$0.36 | \$0.00 | \$0.00 | \$0.00 | \$19.57 | \$25.58 |
| CW-1 0-2,000 Hrs | \$11.22 | | \$6.15 | \$0.34 | \$0.67 | \$0.00 | \$0.34 | \$0.00 | \$0.00 | \$0.00 | \$18.72 | \$24.33 |
| Apprentice Indentured AFTER 9/1/2006 | Percent | | | | | | | | | | | |
| 1st period 0-1000 hrs | 45.00 | \$13.50 | \$4.07 | \$0.00 | \$0.20 | \$0.00 | \$2.50 | \$0.41 | \$0.00 | \$0.00 | \$20.68 | \$27.43 |
| 2nd period 1001-2000 hrs | 45.00 | \$13.50 | \$4.07 | \$0.00 | \$0.20 | \$0.00 | \$2.50 | \$0.41 | \$0.00 | \$0.00 | \$20.68 | \$27.43 |
| 3rd period 2001-3500 hrs | 50.00 | \$15.00 | \$7.10 | \$4.45 | \$0.23 | \$0.00 | \$2.50 | \$0.45 | \$0.00 | \$0.00 | \$29.73 | \$37.23 |
| 4th period 3501-5000 hrs | 55.00 | \$16.50 | \$7.10 | \$4.90 | \$0.25 | \$0.00 | \$2.50 | \$0.50 | \$0.00 | \$0.00 | \$31.75 | \$40.00 |
| 5th period 5001-6500 hrs | 62.00 | \$18.60 | \$7.10 | \$5.52 | \$0.28 | \$0.00 | \$2.50 | \$0.56 | \$0.00 | \$0.00 | \$34.56 | \$43.86 |
| 6th period 6501-8000 hrs | 71.00 | \$21.30 | \$7.10 | \$6.32 | \$0.32 | \$0.00 | \$2.50 | \$0.64 | \$0.00 | \$0.00 | \$38.18 | \$48.83 |

Special Calculation Note : Other is for NEBF (National Electrical Benifit Fund)

Ratio :

1-3 Journeymen to 2 Apprentice
4-6 Journeymen to 4 Apprentice
7-9 Journeymen to 6 Apprentice
first person assigned to any job site shall be a journeyman

Jurisdiction (* denotes special jurisdictional note) :

BUTLER, WARREN*

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

Special Jurisdictional Note : In Warren County the following townships are included: (Deerfield, Hamilton, Harlan, Massie, Salem, Turtle Creek, Union, and Washington)

The scope of work for the light commercial agreement shall apply to the following facilities not to exceed 200,000 square feet; office buildings, shopping centers, auto sales agencies and garages, churches, funeral homes, nursing homes, hotels, retail and wholesale facilities, small stand-alone manufacturing facilities when free standing and not part of a larger facility (not to exceed 50,000 square fee), solar projects (500 panels or less) unless otherwise covered under the agreement, lighting retrofits (when not associated with remodels involving branch re-circuiting) lighting retrofits shall be defined as the changing of lamps and ballasts in existing light fixtures and shall also include the one for one replacement of existing fixtures, warehouses, gas stations, food service centers, restaurants, entertainment facilities, hospitals, clinics, motels, residential buildings.

Details :

Electricians while splicing cable shall receive \$.50 an hour above the regular electrical rate.

All work that requires the use of gas masks or respirators, shall be paid 50% above the appropriate rate of pay. Work up to & including 40 feet shall be paid \$.50 over the journeyman rate. All work from a Boatswain Chair, Swinging Scaffold, or Barrel shall be at double the Journeyman rate. Workmen required to work 50 feet or more below the surface of the earth will be paid 50% above the Journeyman rate.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 648 Voice Data Video

Change # : LCR01-2019fbLoc648VDV

Craft : Voice Data Video Effective Date : 12/24/2019 Last Posted : 12/24/2019

| Classification | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|--|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Electrical Installer Technician A | \$24.35 | \$6.50 | \$0.73 | \$0.46 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$36.44 | \$48.62 |
| Electrical Installer Technician B | \$23.13 | \$6.50 | \$0.69 | \$0.44 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$35.16 | \$46.72 |
| JW Installer Technician B | \$21.92 | \$6.50 | \$0.66 | \$0.42 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$33.90 | \$44.86 |
| Non BICSI Installer | \$15.83 | \$3.00 | \$0.47 | \$0.30 | \$0.00 | \$2.00 | \$0.00 | \$0.00 | \$0.00 | \$21.60 | \$29.51 |
| Apprentice Indentured AFTER 09-03-2018 | | | | | | | | | | | |
| 1st Period 0-800 Hrs | \$13.14 | \$3.00 | \$0.38 | \$0.25 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$17.02 | \$23.59 |
| 2nd Period 801-1600 Hrs | \$13.14 | \$3.00 | \$0.38 | \$0.25 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$17.02 | \$23.59 |
| 3rd Period 1601-2400 Hrs | \$15.83 | \$6.00 | \$0.47 | \$0.30 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$26.60 | \$34.52 |
| 4th Period 2401-3200 Hrs | \$15.83 | \$6.00 | \$0.47 | \$0.30 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$26.60 | \$34.52 |
| 5th Period 3201-4000 Hrs | \$18.26 | \$6.03 | \$0.55 | \$0.35 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$29.19 | \$38.32 |
| 6th Period 4001-4800 Hrs | \$18.26 | \$6.03 | \$0.55 | \$0.35 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$29.19 | \$38.32 |
| 7th Period 4801-5600 Hrs | \$19.48 | \$8.04 | \$0.58 | \$0.30 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$32.40 | \$42.14 |
| 8th Period 5601-6400 Hrs | \$19.48 | \$8.04 | \$0.58 | \$0.37 | \$0.00 | \$4.00 | \$0.00 | \$0.00 | \$0.00 | \$32.47 | \$42.21 |
| Cable Puller | \$12.18 | \$3.00 | \$0.37 | \$0.23 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$16.03 | \$22.12 |

| Apprentice Indentured PRIOR to 09-03-2018 | Percent | | | | | | | | | | | | |
|---|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--|
| 1st period 0-800 hrs | 50.00 | \$12.18 | \$6.50 | \$0.37 | \$0.23 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$19.53 | \$25.61 | |
| 2nd period 801-1600 hrs | 50.00 | \$12.18 | \$6.50 | \$0.37 | \$0.23 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$19.53 | \$25.61 | |
| 3rd period 1601-2400 hrs | 60.00 | \$14.61 | \$6.50 | \$0.44 | \$0.28 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$26.23 | \$33.54 | |
| 4th period 2401-3200 hrs | 65.00 | \$15.83 | \$6.50 | \$0.47 | \$0.30 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$27.50 | \$35.41 | |
| 5th period 3201-4000 hrs | 70.00 | \$17.04 | \$6.50 | \$0.51 | \$0.32 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$28.77 | \$37.30 | |
| 6th period 4001-4800 hrs | 75.00 | \$18.26 | \$6.50 | \$0.55 | \$0.35 | \$0.00 | \$4.40 | \$0.00 | \$0.00 | \$0.00 | \$30.06 | \$39.19 | |
| Cable Puller | 50.00 | \$12.18 | \$3.00 | \$0.37 | \$0.23 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$16.02 | \$22.11 | |

Special Calculation Note :

Ratio :

1 Technician to 2 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BUTLER, WARREN*

Special Jurisdictional Note : The following townships In Warren County are included: (Deerfield, Hamilton, Harlan, Massie, Salem, Turtle Creek, Union, and Washington)

Details :

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

*The installation of computer systems in industrial applications such as assembly lines, robotics, computer controller manufacturing systems.

*The installation of conduit and/or raceways shall be installed by Inside Wireman. On sites where there is no Inside Wireman employed, the

Teledata Technician may install raceway or conduit not greater than 10 ft.

*Fire Alarm work is excluded on all new construction sites or wherever the fire alarm system is installed in conduit

*All HVAC control work.

Prevailing Wage Rate Skilled Crafts

Name of Union: Elevator Local 11

Change # : LCN02-2019fbLoc11

Craft : Elevator Effective Date : 01/01/2020 Last Posted : 11/26/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|-------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Elevator Mechanic | \$47.23 | | \$15.73 | \$10.21 | \$0.63 | \$3.78 | \$8.20 | \$1.51 | \$0.00 | \$0.00 | \$87.29 | \$110.90 |
| Probationary Apprentice | 50.02 | \$23.62 | \$0.00 | \$0.00 | \$0.00 | \$1.42 | \$0.00 | \$0.76 | \$0.00 | \$0.00 | \$25.80 | \$37.62 |
| 1st year | 55.00 | \$25.98 | \$15.73 | \$10.21 | \$0.63 | \$1.56 | \$8.20 | \$0.83 | \$0.00 | \$0.00 | \$63.14 | \$76.12 |
| 2nd year | 65.00 | \$30.70 | \$15.73 | \$10.21 | \$0.63 | \$1.84 | \$8.20 | \$0.98 | \$0.00 | \$0.00 | \$68.29 | \$83.64 |
| 3rd year | 70.00 | \$33.06 | \$15.73 | \$10.21 | \$0.63 | \$1.98 | \$8.20 | \$1.06 | \$0.00 | \$0.00 | \$70.87 | \$87.40 |
| 4th year | 80.00 | \$37.78 | \$15.73 | \$10.21 | \$0.63 | \$2.27 | \$8.20 | \$1.21 | \$0.00 | \$0.00 | \$76.03 | \$94.93 |
| Helper | 70.00 | \$33.06 | \$15.73 | \$10.21 | \$0.63 | \$1.98 | \$8.20 | \$1.06 | \$0.00 | \$0.00 | \$70.87 | \$87.40 |
| Assistant Mechanic | 80.00 | \$37.78 | \$15.73 | \$10.21 | \$0.63 | \$2.27 | \$8.20 | \$1.21 | \$0.00 | \$0.00 | \$76.03 | \$94.93 |

Special Calculation Note : Other is Holiday Pay. Vacation calculated at 6%.

Ratio :

The total number of Helpers & Apprentices employed shall not exceed the number of Mechanics on any one job, except on jobs where (2) teams or more are working, (1) extra Helper or Apprentice may be employed for the first (2) teams and an extra Helper or Apprentice for each additional (3) teams.

- 1 Journeymen to 1 Apprentice
- 2 Journeymen to 5 Apprentice
- 3 Journeymen to 6 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, BROWN, BUTLER, CLERMONT, CLINTON, DARKE, GREENE, HAMILTON, HIGHLAND, MIAMI, MONTGOMERY, PREBLE, SCIOTO, SHELBY, WARREN

Special Jurisdictional Note :

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Glazier Local 387

Change # : LCN03-2019fbLoc387

Craft : Glazier Effective Date : 11/06/2019 Last Posted : 11/06/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Glazier | \$27.03 | | \$5.57 | \$9.85 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$42.70 | \$56.22 |
| Apprentice Percent | | | | | | | | | | | | |
| 1st 6 months | 55.48 | \$15.00 | \$5.57 | \$0.00 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$20.82 | \$28.31 |
| 2nd 6 months | 65.00 | \$17.57 | \$5.57 | \$5.94 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$29.33 | \$38.11 |
| 3rd 6 months | 70.00 | \$18.92 | \$5.57 | \$6.46 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.20 | \$40.66 |
| 4th 6 months | 75.00 | \$20.27 | \$5.57 | \$6.60 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$32.69 | \$42.83 |
| 5th 6 months | 80.00 | \$21.62 | \$5.57 | \$7.18 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$34.62 | \$45.44 |
| 6th 6 months | 85.00 | \$22.98 | \$5.57 | \$7.32 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.12 | \$47.60 |
| 7th 6 months | 90.00 | \$24.33 | \$5.57 | \$7.84 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.99 | \$50.15 |
| 8th 6 months | 95.00 | \$25.68 | \$5.57 | \$8.43 | \$0.25 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$39.93 | \$52.77 |

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

Ratio :

Each employer may employ and train Apprentices in the following ratio to journeymen workers employed.
1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, DARKE, FAYETTE*, GREENE, HAMILTON, HIGHLAND, MIAMI, MONTGOMERY, PREBLE, SHELBY*, WARREN

Special Jurisdictional Note : Fayette County: Eastern portion of route #41 being the dividing line between locals 372 and 387. Local 387 has jurisdiction of projects built on property which borders route #41 East. Shelby County: Southern portion of routes #47 & 29.

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Ironworker Local 44

Change # : LCNO1-2019fbLoc44

Craft : Ironworker Effective Date : 06/05/2019 Last Posted : 06/05/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|------------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Ironworker Reinforcing | \$29.87 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$51.36 | \$66.29 | |
| Structural | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Ornamental | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Machine Mover/Rigger | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Conveyer Mechanic | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Maintenance/Heavy Hwy | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Welder A | \$29.62 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$51.11 | \$65.92 | |
| Welder B | \$29.87 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$51.36 | \$66.29 | |
| Sheeter | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Fence Erector | \$27.90 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$49.39 | \$63.34 | |
| Ironworker | \$29.37 | \$8.20 | \$9.50 | \$0.60 | \$0.00 | \$3.00 | \$0.19 | \$0.00 | \$0.00 | \$50.86 | \$65.54 | |
| Apprentice | Percent | | | | | | | | | | | |
| Apprentice | | | | | | | | | | | | |
| 1st yr A | 55.00 | \$16.43 | \$8.20 | \$9.50 | \$0.60 | \$0.75 | \$0.19 | \$0.00 | \$0.00 | \$35.67 | \$43.88 | |
| 1st yr B | 60.00 | \$17.92 | \$8.20 | \$9.50 | \$0.60 | \$0.75 | \$0.19 | \$0.00 | \$0.00 | \$37.16 | \$46.12 | |
| 1st yr C | 65.00 | \$19.42 | \$8.20 | \$9.50 | \$0.60 | \$0.75 | \$0.19 | \$0.00 | \$0.00 | \$38.66 | \$48.36 | |
| 2nd yr A | 70.00 | \$20.91 | \$8.20 | \$9.50 | \$0.60 | \$0.75 | \$0.19 | \$0.00 | \$0.00 | \$40.15 | \$50.60 | |
| 2nd yr B | 75.00 | \$22.40 | \$8.20 | \$9.50 | \$0.60 | \$0.75 | \$0.19 | \$0.00 | \$0.00 | \$41.64 | \$52.84 | |
| 3rd yr A | 80.00 | \$23.90 | \$8.20 | \$9.50 | \$0.60 | \$1.50 | \$0.19 | \$0.00 | \$0.00 | \$43.89 | \$55.83 | |
| 3rd yr B | 85.00 | \$25.39 | \$8.20 | \$9.50 | \$0.60 | \$1.50 | \$0.19 | \$0.00 | \$0.00 | \$45.38 | \$58.07 | |
| 4th yr A | 90.00 | \$26.88 | \$8.20 | \$9.50 | \$0.60 | \$2.25 | \$0.19 | \$0.00 | \$0.00 | \$47.62 | \$61.06 | |
| 4th yr B | 95.00 | \$28.38 | \$8.20 | \$9.50 | \$0.60 | \$2.25 | \$0.19 | \$0.00 | \$0.00 | \$49.12 | \$63.30 | |
| 4th yr C | 100.00 | \$29.87 | \$8.20 | \$9.50 | \$0.60 | \$2.25 | \$0.19 | \$0.00 | \$0.00 | \$50.61 | \$65.54 | |

Special Calculation Note : Other is Impact Fund Training

Ratio :

1 Journeymen to 1 Apprentice
2 Journeymen to 2 Apprentice
10 Journeymen to 4 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

ADAMS*, BROWN, BUTLER*, CLERMONT,
CLINTON*, HAMILTON, HIGHLAND*,
WARREN*

Special Jurisdictional Note : Adams County Twps included: Bratton, Scott, Winchester, Wayne. Butler County Twps included: Oxford, St. Clair, Fairfield, Morgan, Liberty, Union, Ross, Reily, Hanover. West Chester. In Clinton County, Manchester and South West Borrow. Highland County Twps included: Dotson, Salem, Clay, White Oak, Hamer, New Market, Concord, Jackson, Washington. Warren County Twps included: Harlan, Deerfield, Hamilton.

Details :

Structural Iron Work but not limited to:field fabrication, all loading to and including the erecting,rigging,assembly,dismantling, placing, temporary and permanent securing by any means of all structural iron,steel,ornamental lead,bronze,brass,copper,aluminum,glass all ferrous and non ferrous metal and composite material, precast prestressed and post-stressed concrete structures. Bridges and bridge rails,bridge viaducts,bucks bulkheads,bumper and bumper post,canopies and unistrut canopies,corrugated ferrous and non ferrous sheets when attached to steel frames,columns,beams,bar-joists,trusses,grinders,roof decking,electrical supports,elevator cars,elevator fronts and enclosures,erection of steel towers,flag poles, gymnasium equipment,stadium and arena seating,jail cell work,jail cell beds,benches,bunks,chairs,tables,mirrors,jail cell access doors,rigging and installation of machinery and equipment(erecting,aligning,anchoring and dismantling, erection and dismantling of tower cranes,derrick monorail systems, Chicago booms,overhead cranes,gantries,material and personnel hoists,tanks,hoppers and conveyors. All pre-engineered metal buildings and their entirety including siding,roofing, gutters, downspouts and erection of all.

Ornamental Iron Work but not limited to:all work in connection with field fabrication,handling including loading/off loading,sorting,cutting,fastening,anchoring,bending,hoisting,placing,burning,welding,and tying,dismantling of all materials used in miscellaneous iron or steel, for stairs,hand railings,rolling doors, rolling gates,rolling shutters,fence,windows,curtain wall,erection and welding of all metal, sash,architectural and ornamental treatments, but not necessarily limited to all sizes and types of ornamental,steel iron,lead,bronze,brass,copper,aluminum,all ferrous and non ferrous metals and composite materials

Fence Erector Iron Worker but not limited to: All work in connection with the field fabrication and erection of chain link fence,which includes but not limited to the loading and of the fence fabric and posts also the installation of the above.

Prevailing Wage Rate Skilled Crafts

Name of Union: Ironworker Local 290

Change # : LCN01-2019fbLoc290

Craft : Ironworker Effective Date : 06/01/2019 Last Posted : 05/23/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Ironworker Structural | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Welder | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Fence Erector | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Reinforcing Rods | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Machinery Mover | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Sheeter | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Metal Building Erector | \$29.23 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.60 | \$66.21 | |
| Rigger & Erector | \$29.29 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$4.00 | \$0.02 | \$0.00 | \$0.00 | \$51.66 | \$66.30 | |
| Apprentice | Percent | | | | | | | | | | | |
| 1st year | 65.15 | \$19.04 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$2.50 | \$0.02 | \$0.00 | \$0.00 | \$39.91 | \$49.44 |
| 2nd year | 75.15 | \$21.97 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$2.50 | \$0.02 | \$0.00 | \$0.00 | \$42.84 | \$53.82 |
| 3rd year | 85.15 | \$24.89 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$2.50 | \$0.02 | \$0.00 | \$0.00 | \$45.76 | \$58.20 |
| 4th year | 95.15 | \$27.81 | \$8.20 | \$9.50 | \$0.65 | \$0.00 | \$2.50 | \$0.02 | \$0.00 | \$0.00 | \$48.68 | \$62.59 |

Special Calculation Note : Other is for Industry Fund.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ALLEN*, AUGLAIZE, BUTLER*, CHAMPAIGN*, CLARK, CLINTON, DARKE, FAYETTE*, GREENE, HARDIN*, HIGHLAND*, LOGAN*, MADISON*, MERCER*, MIAMI, MONTGOMERY, PREBLE, SHELBY, VAN WERT*, WARREN*

Special Jurisdictional Note : Allen County Twps included are: Auglaize, Perry, Shawnee, Amanda, Spencer, Marion, Sugar Creek, American, Bath, Jackson. Butler County Twps included are: Milford, Wayne, Madison, Lemon. Champaign Cnty Twps included are: Union, Urbana, Jackson, Concord, Salem, Mad River, Johnson, Harrison, Adams. Fayette County Twps included are: Green, Jasper, Concord, Jefferson. Hardin County Twps included are: Round Head, Marion,

Liberty. Highland County Twps included are: Fairfield, Penn, Union, Marshall, Liberty, Paint, Brush Creek. Logan County Twps included are: Richland, Stokes, Bloomfield, Washington, Harrison, McArthur, Lake, Liberty, Pleasant, Miami. Madison County Twps included are: Stokes. Mercer County Twps included are: Dublin, Washington, Jefferson, Recovery, Gibson, Union, Liberty, Butler, Granville, Center, Hopewell, Franklin, Marion. VanWert County Twps included are: Jennings. Warren County Twps included are: Franklin, Clear Creek, Turtle Creek, Wayne, Massie, Washington, Salem, Union.

Details :

Structural Iron Work but not limited to:field fabrication, all loading to and including the erecting,rigging,assembly,dismantling, placing, temporary and permanent securing by any means of all structural iron,steel,ornamental lead,bronze,brass,copper,aluminum,glass all ferrous and non ferrous metal and composite material, precast prestressed and post-stressed concrete structures. Bridges and bridge rails,bridge viaducts,bucks bulkheads,bumper and bumper post,canopies and unistrut canopies,corrugated ferrous and non ferrous sheets when attached to steel frames,columns,beams,bar-joists,trusses,grinders,roof decking,electrical supports,elevator cars,elevator fronts and enclosures,erection of steel towers,flag poles, gymnasium equipment,stadium and arena seating,jail cell work,jail cell beds,benches,bunks,chairs,tables,mirrors,jail cell access doors,rigging and installation of machinery and equipment(erecting,aligning,anchoring and dismantling, erection and dismantling of tower cranes,derrick monorail systems, Chicago booms,overhead cranes,gantries,material and personnel hoists,tanks,hoppers and conveyors. All pre-engineered metal buildings and their entirety including siding,roofing, gutters, downspouts and erection of all.

Ornamental Iron Work but not limited to:all work in connection with field fabrication,handling including loading/off loading,sorting,cutting,fastening,anchoring,bending,hoisting,placing,burning,welding,and tying,dismantling of all materials used in miscellaneous iron or steel, for stairs,hand railings,rolling doors, rolling gates,rolling shutters,fence,windows,curtain wall,erection and welding of all metal, sash,architectural and ornamental treatments, but not necessarily limited to all sizes and types of ornamental,steel iron,lead,bronze,brass,copper,aluminum,all ferrous and non ferrous metals and composite materials

Fence Erector Iron Worker but not limited to: All work in connection with the field fabrication and erection of chain link fence,which includes but not limited to the loading and of the fence fabric and posts also the installation of the above.

Prevailing Wage Rate Skilled Crafts

Name of Union: Labor HevHwy 3

Change # : LCN01-2019fbLocalHevHwy3

Craft : Laborer Group 1 Effective Date : 05/23/2019 Last Posted : 05/23/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Laborer Group 1 | \$31.62 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$42.87 | \$58.68 |
| Group 2 | \$31.79 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$43.04 | \$58.94 |
| Group 3 | \$32.12 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$43.37 | \$59.43 |
| Group 4 | \$32.57 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$43.82 | \$60.11 |
| Watch Person | \$24.35 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$35.60 | \$47.78 |
| Apprentice | Percent | | | | | | | | | | | |
| 0-1000 hrs | 60.00 | \$18.97 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$30.22 | \$39.71 |
| 1001-2000 hrs | 70.00 | \$22.13 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$33.38 | \$44.45 |
| 2001-3000 hrs | 80.00 | \$25.30 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$36.55 | \$49.19 |
| 3001-4000 hrs | 90.00 | \$28.46 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$39.71 | \$53.94 |
| More than 4000 hrs | 100.00 | \$31.62 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$42.87 | \$58.68 |

Special Calculation Note : Watchmen have no Apprentices. Tunnel Laborer rate with air-pressurized add \$1.00 to the above wage rate.

Ratio :

- 1 Journeymen to 1 Apprentice
- 3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

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

TUSCARAWAS, UNION, VAN WERT, VINTON,
WARREN, WASHINGTON, WAYNE, WILLIAMS,
WYANDOT

Special Jurisdictional Note : Hod Carriers and Common Laborers - Heavy, Highway, Sewer, Waterworks, Utility, Airport, Railroad, Industrial and Building Site, Sewer Plant, Waste Water Treatment Facilities Construction

Details :

Group 1

Laborer (Construction); Plant Laborer or Yardman, Right-of-way Laborer, Landscape Laborer, Highway Lighting Worker, Signalization Worker, (Swimming) Pool Construction Laborer, Utility Man, *Bridge Man, Handyman, Joint Setter, Flagperson, Carpenter Helper, Waterproofing Laborer, Slurry Seal, Seal Coating, Surface Treatment or Road Mix Laborer, Riprap Laborer & Grouter, Asphalt Laborer, Dump Man (batch trucks), Guardrail & Fence Installer, Mesh Handler & Placer, Concrete Curing Applicator, Scaffold Erector, Sign Installer, Hazardous Waste (level D), Diver Helper, Zone Person and Traffic Control.

*Bridge Man will perform work as per the October 31, 1949, memorandum on concrete forms, by and between the United Brotherhood of Carpenters and Joiners of America and the Laborers' International Union of North America, which states in; "the moving, cleaning, oiling and carrying to the next point of erection, and the stripping of forms which are not to be re-used, and forms on all flat arch work shall be done by members of the Laborers' International Union of North America."

Group 2

Asphalt Raker, Screwman or Paver, Concrete Puddler, Kettle Man (pipeline), All Machine-Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Skid Steer, Sheeting & Shoring Person, Surface Grinder Person, Screedperson, Water Blast, Hand Held Wand, Power Buggy or Power Wheelbarrow, Paint Striper, Plastic fusing Machine Operator, Rodding Machine Operator, Pug Mill Operator, Operator of All Vacuum Devices Wet or Dry, Handling of all Pumps 4 inches and under (gas, air or electric), Diver, Form Setter, Bottom Person, Welder Helper (pipeline), Concrete Saw Person, Cutting with Burning Torch, Pipe Layer, Hand Spiker (railroad), Underground Person (working in sewer and waterline, cleaning, repairing and reconditioning). Tunnel Laborer (without air), Caisson, Cofferdam (below 25 feet deep), Air Track and Wagon Drill, Sandblaster Nozzle Person, Hazardous Waste (level B), ***Lead Abatement, Hazardous Waste (level C)

***Includes the erecting of structures for the removal, including the encapsulation and containment of Lead abatement process.

Group 3

Blast and Powder Person, Muckers will be defined as shovel men working directly with the miners, Wrencher (mechanical joints & utility pipeline), Yarnier, Top Lander, Hazardous Waste (level A), Concrete Specialist, Curb Setter and Cutter, Grade Checker, Concrete Crew in Tunnels. Utility pipeline Tappers, Waterline, Caulker, Signal Person will receive the rate equal to the rate paid the Laborer classification for which the Laborer is signaling.

Group 4

Miner, Welder, Gunitite Nozzle Person

A.) The Watchperson shall be responsible to patrol and maintain a safe traffic zone including but not limited to barrels, cones, signs, arrow boards, message boards etc.

The responsibility of a watchperson is to see that the equipment, job and office trailer etc. are secure.

Prevailing Wage Rate Skilled Crafts

Name of Union: Labor Local 534 Building

Change # : LCNO1-2019fbLoc534

Craft : Laborer Effective Date : 06/01/2019 Last Posted : 05/23/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|-------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Laborer Group 1 | \$27.59 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$38.84 | \$52.64 |
| Laborer Group 2 | \$27.69 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$38.94 | \$52.79 |
| Laborer Group 3 | \$27.79 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$39.04 | \$52.94 |
| Laborer Group 4 | \$27.92 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$39.17 | \$53.13 |
| Laborer Group 5 | \$28.17 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$39.42 | \$53.51 |
| Laborer Group 6 | \$27.94 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$39.19 | \$53.16 |
| Laborer Group 7 | \$27.14 | | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$38.39 | \$51.96 |
| Apprentice | Percent | | | | | | | | | | | |
| 0-1000 hrs | 60.00 | \$16.55 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$27.80 | \$36.08 |
| 1001-2000 hrs | 70.00 | \$19.31 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$30.56 | \$40.22 |
| 2001-3000 hrs | 80.00 | \$22.07 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$33.32 | \$44.36 |
| 3001-4000 | 90.00 | \$24.83 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$36.08 | \$48.50 |
| 4001 | 100.00 | \$27.59 | \$7.00 | \$3.70 | \$0.45 | \$0.00 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$38.84 | \$52.64 |

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

Ratio :

1 Journeyman to 1 Apprentice
3 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

BUTLER, WARREN

Special Jurisdictional Note :

Details :

Note:

Group 1: Building & Common Laborer; All general laborers work including all forms of landscaping, Rough Rider - all pump's 4 inch or smaller, Small Pump Portable Generators-Bobcat to Cleanup, Firewatch and Monitor, (Safety Person)

Group 2: Asphalt Raker, Tamper, Smoother, Hand Air Pump, Hand air Tamper, Chisel, Power Tamper, Operator, Switch, Assemblies, Handling & Laying Precast Concrete Floors & Deck Tool Repairman.

Group 3: Concrete Specialist; Skid Steers (with attachments to perform Laborer's duties) Jack Hammer * Concrete Busterman, Barco Tamper Man, Power Georgia Buggy Man, Power Sweeper Man, Vibrator, Concrete Saw Man, Rail Spikers, Acetylene Burner, Pipelayers, Bos'n Cradleman, Bottom Man, Chipping Hammer Grade Checker, Radio Operator, Form Cleanout & blowout Man, Red Concrete Coloring Man (Electrical Safety)

Group 4: Mason Tender, Mortar Mixers & Scaffold Builders

Group 5: Fork Lift for Mason, all work involving Refractory Materials Including Demolition of Refractory Materials.

Asbestos Removal and Hazardous Waste Removal (handling, control, removal abatement, encapsulation or disposal of asbestos & hazardous waste),

Group 6: Gunnite Man, Sand Blaster, Concrete & Grout Pump & Hose Man, Blast Trac, Miners & Muckers, Free Air, Powderman or Blaster, Mortar or Gypsum Machineman, Welder, Scuba Diver.

Group 7: Watchman & Tool Checker/Toolroom Man

Prevailing Wage Rate Skilled Crafts

Name of Union: Operating Engineers - Building Local 18 - Zone III

Change # : LCN01-2019fbLoc18zone3

Craft : Operating Engineer Effective Date : 05/01/2019 Last Posted : 05/01/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Operator Class 1 | \$37.14 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.34 | \$70.91 |
| Class 2 | \$37.02 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.22 | \$70.73 |
| Class 3 | \$35.98 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$51.18 | \$69.17 |
| Class 4 | \$34.80 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$50.00 | \$67.40 |
| Class 5 | \$29.34 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.54 | \$59.21 |
| Class 6 | \$37.39 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.59 | \$71.28 |
| Class 7 | \$37.64 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.84 | \$71.66 |
| Class 8 | \$38.14 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$53.34 | \$72.41 |
| Class 9 | \$38.39 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$53.59 | \$72.78 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st Year | 50.00 | \$18.57 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$33.77 | \$43.06 |
| 2nd Year | 60.00 | \$22.28 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$37.48 | \$48.63 |
| 3rd Year | 70.00 | \$26.00 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$41.20 | \$54.20 |
| 4th Year | 80.00 | \$29.71 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.91 | \$59.77 |
| Field Mechanic Trainee | | | | | | | | | | | | |
| 1st Year | 50.00 | \$18.57 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$33.77 | \$43.06 |
| 2nd Year | 60.00 | \$22.28 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$37.48 | \$48.63 |
| 3rd Year | 70.00 | \$26.00 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$41.20 | \$54.20 |
| 4th Year | 80.00 | \$29.71 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.91 | \$59.77 |

Special Calculation Note : Other: Education & Safety \$0.09

Ratio :

For every (3) Operating Engineer Journeymen employed by the company there may be employed (1) Registered Apprentice or trainee Engineer through the referral when they are available. An apprentice, while employed as part of a crew per Article VIII, paragraph 77, will not be subject to the apprenticeship ratios in this collective bargaining agreement

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note :

Details :

**Apprentices will receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Class 1 - Barrier Moving Machine; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types) Derricks (all types); Draglines Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Gradalls; Helicopter Operators; hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types); Hoists (with two or more drums in use); Hydraulic Gantry (lift system); Laser Finishing Machines; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Engineers (Mechanic and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms, Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device); Rotary Drills (all) used on caissons for foundations and sub-structure work; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Tug Boats. Horizontal Directional Drill, Rough Terrain Fork-lift with Winch/Hoist, Laser Screed, and Like equipment; Compact Cranes, track or rubber over 4,000 pound capacity, self-erecting cranes: stationary, track or truck (all configurations) bucket trench machines (over 24 " wide).

Class 2 - Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs. Bulldozers; CMI type Equipment; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats; Vermeer Type Concrete Saw; All rotomills, grinders & planers of all types. Articulating/end dumps (minus \$4.00/hour from Class 2 rate)

Class 3 - A Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or skid steer loader with or without attachments; Boilers (15 lbs pressure and over); All concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drillers - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call button controlled); Man lifts; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie Inserter/Remover; Rotator (Lime-Soil Stabilizer); Submersible Pumps (4 inches and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24 inches and under); Utility Operators; Material hoist/elevators.

Class 4 - Ballast Re-locator; Backfillers and Tampers; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Spreader; Conveyors, used for handling building materials; Concrete Mixers, one bag capacity (side loader); Concrete Mixers, capacity more than one bag; Crushers; Deck Hands; Drum Fireman (in Asphalt Plant); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators; Guniting Machines; Hydro-Seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2 inch discharge); Road Widening Trenchers; Rollers (except asphalt); All Concrete pumps (without Boom with 4 inch or smaller systems); Self-Propelled Power Spreaders; Concrete Spreaders; Self-Propelled Sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepfoot rollers or graders; VAC/ALLS; Vibratory Compactors, with integral power; Welder Operators.

Class 5 - Boilers (less than 15 lbs. pressure); Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen, Submersible Pumps (under 4 inch discharge). Directional Drill Locator and Allen Screed Concrete Paver. Fueling and greasing (plus \$3.00), compact cranes; track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Class 7 - Boom & Jib 150 - 180 feet

Class 8 - Boom & Jib 180 - 249 feet

Class 9 - Boom & Jib 250 - or over

Prevailing Wage Rate Skilled Crafts

Name of Union: Operating Engineers - HevHwy Zone II

Change # : LCN01-2019fbLoc18hevhwylI

Craft : Operating Engineer Effective Date : 05/01/2019 Last Posted : 05/01/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|----------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Operator Class 1 | \$37.14 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.34 | \$70.91 |
| Class 2 | \$37.02 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.22 | \$70.73 |
| Class 3 | \$35.98 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$51.18 | \$69.17 |
| Class 4 | \$34.80 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$50.00 | \$67.40 |
| Class 5 | \$29.34 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.54 | \$59.21 |
| Class 6 | \$37.39 | | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$52.59 | \$71.28 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st Year | 50.00 | \$18.57 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$33.77 | \$43.06 |
| 2nd Year | 60.00 | \$22.28 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$37.48 | \$48.63 |
| 3rd Year | 70.00 | \$26.00 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$41.20 | \$54.20 |
| 4th Year | 80.00 | \$29.71 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.91 | \$59.77 |
| Field Mech Trainee Class 2 | | | | | | | | | | | | |
| 1st year | 49.85 | \$18.51 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$33.71 | \$42.97 |
| 2nd year | 59.79 | \$22.21 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$37.41 | \$48.51 |
| 3rd year | 69.77 | \$25.91 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$41.11 | \$54.07 |
| 4th year | 79.75 | \$29.62 | \$8.26 | \$6.00 | \$0.85 | \$0.00 | \$0.00 | \$0.09 | \$0.00 | \$0.00 | \$44.82 | \$59.63 |

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

Ratio :

For every (3) Operating Engineer Journeymen employed by the company , there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An apprentice, while employed as part of a crew per Article VIII paragraph 65, will not be subject the apprenticeship ratios in this collective bargaining agreement.

Jurisdiction (* denotes special jurisdictional note) :

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

SHELBY, STARK, TUSCARAWAS, UNION, VAN
WERT, VINTON, WARREN, WASHINGTON,
WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

**Apprentices will receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if they are required to have CDL.

Class 1 - Air Compressors on Steel Erection; Barrier Moving Machine; Boiler Operators, on Compressors or Generators, when mounted on a rig; Cableways, Combination Concrete mixers & Towers; Concrete Pumps; Concrete Plants (over 4 yd capacity); Cranes (all types, including Boom Trucks, Cherry Pickers); Derricks; Draglines, Dredgers (dipper, clam or suction); Elevating Graders or Euclid Loaders; Floating Equipment (all types); Gradalls, Helicopter Crew (Operator- hoist or winch); Hoes (all types); Hoisting Engines, on shaft or tunnel work; Hydraulic Gantry (lifting system); Industrial - Type Tractors; Jet Engine Dryers (D8 or D9), Diesel Tractors; Locomotives (standard gage); Maintenance Operators (class A); Mixers, paving (single or double drum); Mucking Machines; Multiple Scrapers; Piledriving Machines (all types); Power Shovels, Prentice Loader; Quad 9 (double pusher); Rail Tamper (with automatic lifting and aligning device); Refrigerating Machines (freezer operation); Side Booms; Slip Form Pavers; Tower Dericks; Tree Shredders; Truck Mounted Concrete Pumps; Tug Boats; Tunnel Machines and /or Mining Machines; Wheel Excavators. Rough Terrain Fork-lift with Winch/Hoist; Compact Cranes, track rubber over 4,000 pound capacity, self-erecting cranes; stationary, track or truck (all configurations) Bucket trench machines (over 24 inches wide).

Class 2 - Asphalt Pavers; Automatic Subgrade Machines, self-propelled (CMI-type); Bobcat-type and /or skid steer loader with hoe attachment greater than 7000 lbs.; Boring Machine Operators (more than 48 inches); Bulldozers; Endloaders; Hydro Milling Machine; Kolman-type Loaders (production type-dirt); Lead Greasemen; Maintenance Operators, Class B (Portage and Summit Counties only); Pettibone-Rail Equipment; Power Graders; Power Scrapers; Push Cats; Lighting and Traffic Signal Installation Equipment includes all groups or classifications; Trench Machines (24inch wide and under); Vermeer Type Concrete saw. Material Transfer Equipment (Shuttle buggy) Asphalt; All rotomills,grinders and planers of all types. Horizontal Directional Drill (Over 50,000 ft.lbs.thrust and over)

Class 3 - A-Frames; Air Compressors, on tunnel work (low Pressure); Asphalt Plant Engineers; Bobcat-type and/or skid steer loader with or without attachments; Power Boilers (15 lbs pressure and over); Highway Drills (all types); Rollers, asphalt; Pump Operators (installing or operating well Points); Pumps (4 inch and over discharge); Railroad Tie Inserter/Remover; Rotator (lime-soil Stabilizer), Switch & Tie Tampers (without lifting and aligning device); Locomotives (narrow gage); Mixers, concrete (more than one bag capacity); Mixers, one bag capacity (side loader); Utilities Operators, (small equipment); Welding Machines; Material hoist/elevators. Articulating/straight bed end dumps if assigned (minus \$4.00 per hour).

Class 4 -Ballast Re-locator; Backfillers, Batch Plants; Bar and Joint Installing Machines; Boring Machine Operators (48 inch or less); Bull Floats; Burlap and Curing Machines; Concrete Plants (capacity 4 yd and under); Conveyors (highway); Concrete Saws (multiple); Crushers; Deckhands; Farm type tractors, with attachments (highway), except masonry; Finishing Machines; Firemen, Floating Equipment (all types); Fork Lifts (highway); Form Trenchers; Hydro Hammers; Hydro Seeders; Pavement Breakers; Plant Mixers; Post Drivers; Post Hole Diggers (power auger); Power Brush Burners; Power Form Handling Equipment; Road Widening Trenchers; Rollers (brick, grade, macadam); Self-Propelled Power Spreaders; Self-Propelled Sub-Graders; Tractors, pulling sheepsfoot rollers or graders; Steam Firemen; Vibratory Compactors, with integral power.

Class 5 - Compressors (portable, Sewer, Heavy and Highway); Generators; Inboard-Outboard Motor Boat Launches; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters; Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signalmen; Drum Fireman (in Asphalt Plant); Oil Heaters (Asphalt Plant); Tire Repairmen; VAC/ALLS; Fueling and greasing (plus \$3.00), compact cranes: track or rubber under 4,000 pounds.

Class 6 - Master Mechanic

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Locals 123 & 238

Change # : OCR01-2019fbLoc123-238

Craft : Drywall Finisher Effective Date : 08/21/2019 Last Posted : 08/21/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--------------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Painter Drywall Finisher | \$24.61 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.55 | \$47.85 |
| Tapers and Finishers | \$24.61 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.55 | \$47.85 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st year | 55.00 | \$13.54 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$21.84 | \$28.60 |
| 2nd year | 65.00 | \$16.00 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$24.30 | \$32.29 |
| 2rd year | 75.00 | \$18.46 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$26.76 | \$35.99 |
| 4th year | 80.00 | \$19.69 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$27.99 | \$37.83 |

Special Calculation Note : Apprentices shall be paid the proper % of the classification above.

Ratio :

1 Journeyman to 1 Apprentice per job

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, CLINTON, HAMILTON, WARREN

Special Jurisdictional Note :

Details :

Industrial Work paid as commercial work above for each class which includes, Industrial Plants, repair garages, processing plants, storage tanks, warehouses, skeletons structures, bridges unless highest point of clearance is 60 feet or more whether new or old construction offices and office buildings in industrial sites are at industrial rates. Heavy & Highway Bridges-Guard Rails- Light Poles. A hazardous steeplejack rate shall apply on radio towers, stacks, light towers, water towers, steeples, skeleton steel, and exterior industrial conveyors over 25 feet, where such items require steeplejack methods and the rate of pay shall be a \$1.00 per hour above the industrial rate. Steeplejack rate to apply to bridges where highest point of clearance is 60 feet.

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Locals 123 & 238
Commercial & Industrial

Change # : OCR01-2019fbLoc123

Craft : Painter Effective Date : 08/21/2019 Last Posted : 08/21/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|----------------------------|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Painter Brush Roll | \$24.61 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.55 | \$47.85 |
| Paper Hanger | \$24.61 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.55 | \$47.85 |
| Spray Painter | \$25.11 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.05 | \$48.60 |
| Sand Blaster Water Blaster | \$25.36 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.30 | \$48.98 |
| Elevated Tanks | \$25.61 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.55 | \$49.35 |
| Apprentice | | | | | | | | | | | | |
| | Percent | | | | | | | | | | | |
| 1st year | 55.00 | \$13.54 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$21.84 | \$28.60 |
| 2nd year | 65.00 | \$16.00 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$24.30 | \$32.29 |
| 3rd year | 75.00 | \$18.46 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$26.76 | \$35.99 |
| 4th year | 80.00 | \$19.69 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$27.99 | \$37.83 |

Special Calculation Note : Apprentices shall be paid the proper % of the classification above.

Ratio :

(1) Journeymen to (1) Apprentice per jobsite

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, CLINTON, HAMILTON, WARREN

Special Jurisdictional Note :

Details :

Industrial Work paid as commercial work above for each class which includes, Industrial Plants, repair garages, processing plants, storage tanks, warehouses, skeletons structures, bridges unless highest point of clearance is 60 feet or more whether new or old construction offices and office buildings in industrial sites are at industrial rates. Heavy & Highway Bridges-Guard Rails- Light Poles. A hazardous steeplejack rate shall apply on radio towers, stacks, light towers, water towers, steeples, skeleton steel, and exterior industrial conveyors over 25 feet, where such items require steeplejack methods and the rate of pay shall be a \$1.00 per hour above the industrial rate. Steeplejack rate to apply to bridges where highest point of clearance is 60 feet.

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Local 123 & 238 Hvy Hwy

Change # : OCR01-2019fbLoc123

Craft : Painter Effective Date : 08/21/2019 Last Posted : 08/21/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|--|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Painter Bridge Class 1 | \$30.00 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.94 | \$55.94 |
| Bridge Painter, Rigger, Containment Builder, Spot Blaster Class 2 | \$25.00 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.94 | \$48.44 |
| Equipment Operator/Field Mechanic, Grit Reclamation, Paint Mixer, Traffic Control, Boat Person Class 3 | \$25.00 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.94 | \$48.44 |
| Concrete Sealing, Concrete Blasting/Power Washing, Etc. Class 4 | \$25.00 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.94 | \$48.44 |
| Quality Control/Quality Assurance, Traffic Safety, Competent Person Class 5 | \$24.00 | | \$5.69 | \$4.94 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$34.94 | \$46.94 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st year | 55.00 | \$16.50 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$24.80 | \$33.05 |
| 2nd year | 65.00 | \$19.50 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$27.80 | \$37.55 |
| 3rd year | 75.00 | \$22.50 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$30.80 | \$42.05 |
| 4th year | 80.00 | \$24.00 | \$5.69 | \$2.30 | \$0.31 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$32.30 | \$44.30 |

Special Calculation Note : Apprentices shall be paid proper % of the classification above..

Ratio :

1 Journeyman to 1 Apprentice per job

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, CLINTON,
HAMILTON, WARREN

Special Jurisdictional Note :

Details :

Industrial Work paid as commercial work above for each class which includes, Industrial Plants, repair garages, processing plants, storage tanks, warehouses, skeletons structures, bridges unless highest point of clearance is 60 feet or more whether new or old construction offices and office buildings in industrial sites are at industrial rates. Heavy & Highway Bridges-Guard Rails- Light Poles. A hazardous steeplejack rate shall apply on radio towers, stacks, light towers, water towers, steeples, skeleton steel, and exterior industrial conveyors over 25 feet, where such items require steeplejack methods and the rate of pay shall be a \$1.00 per hour above the industrial rate. Steeplejack rate to apply to bridges where highest point of clearance is 60 feet.

Class 1 – Abrasive blasting of any kind.

Class 2 – Bridge painting, coating application of any kind. All steel surface preparation other than abrasive blasting. All necessary rigging and containment building. All remedial/ spot blasting.

Class 3 – Tend to all equipment including but not limited to abrasive blasting, power washing, spray painting, forklifts, hoists, trucks, etc. Load and unload trucks, handle materials, man safety boats, handle traffic control, clean up/ vacuum abrasive blast materials and related tasks.

Class 4 – All aspects of concrete coating/ sealing including but not limited to preparation, containment, etc.

Class 5 – Verify and record that all work is completed according to job specifications. Assure that all health and safety standards are adhered to. Assure all traffic is safely handled.

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Local 639

Change # : LCNO1-2015fbLoc639

Craft : Painter Effective Date : 06/10/2015 Last Posted : 06/10/2015

| | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|--------------------------------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | |
| Painter Metal Finisher/Helpers | | | | | | | | | | | |
| Top Helper Class A | \$19.09 | \$3.65 | \$0.00 | \$0.00 | \$0.66 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$23.40 | \$32.94 |
| Top Helper Class B | \$19.09 | \$3.65 | \$0.65 | \$0.00 | \$1.03 | \$0.00 | \$0.37 | \$0.00 | \$0.00 | \$24.79 | \$34.33 |
| Top Helper Class C | \$19.09 | \$3.65 | \$1.00 | \$0.00 | \$1.76 | \$0.00 | \$0.37 | \$0.00 | \$0.00 | \$25.87 | \$35.41 |
| Helper Class A | \$14.69 | \$3.65 | \$0.00 | \$0.00 | \$0.51 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$18.85 | \$26.19 |
| Helper Class B | \$14.69 | \$3.65 | \$0.65 | \$0.00 | \$0.79 | \$0.00 | \$0.28 | \$0.00 | \$0.00 | \$20.06 | \$27.40 |
| Helper Class C | \$14.69 | \$3.65 | \$1.00 | \$0.00 | \$1.64 | \$0.00 | \$0.28 | \$0.00 | \$0.00 | \$21.26 | \$28.60 |
| New Hire 90 Days | \$11.00 | \$3.65 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$14.65 | \$20.15 |

Special Calculation Note : Other is Sick and Personal Time

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

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

SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN
WERT, VINTON, WARREN, WASHINGTON,
WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Top Helper: Shall perform the responsibilities of a Helper and be responsible for the setup, break down, safety and quality of the company's product.

Helper : Shall be responsible for performing tasks in refinishing, compliance with safety procedures, setting up and breaking down job sites, scaffolding and swing stages and preparing surfaces for refinishing including but not limited to, masking and stripping and cleaning, oxidizing, polishing and scratch removal on various surfaces

Class A Workers: Less than 1 Year of Service.

Class B Workers: More than 1 and less than 8 Years of Service.

Class C Workers: More than 8 Years of Service.

Metal Polisher Scope of Work: Polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, nickel, aluminum and stainless steel and in metal specialty work, various stone finishes, stone specialty work and any other work pertaining to the finishing of metal, stones, woods, and any window washing/cleaning done in conjunction with this work, using chemicals, solvents, coatings and hand applied lacquer thinner, removing scratches from mirror finished metals, burnishing of bronze, statuary finishes on exterior and interior surfaces and the use of all tools required to perform such work, including but not limited to polishes, spray equipment and scaffolding.

Swing State Rate: All work on scaffold 4 sections or higher, including any boom lifts and swing stage scaffolds including the rigging and derigging of hanging/suspended swing stage systems and rappelling/bolson chair work, ADD \$1.50 per hour.

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Local 639 Zone 2 Sign

Change # : LCN01-2016fbLoc639

Craft : Painter Effective Date : 08/03/2016 Last Posted : 08/03/2016

| | BHR | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|--|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | |
| Painter Sign Journeyman Tech/Team Leader Class A | \$21.25 | \$1.33 | \$0.14 | \$0.00 | \$0.00 | \$0.00 | \$0.57 | \$0.00 | \$0.00 | \$23.29 | \$33.92 |
| Painter Sign Journeyman Tech/Team Leader Class B | \$21.25 | \$1.33 | \$0.14 | \$0.00 | \$0.41 | \$0.00 | \$0.57 | \$0.00 | \$0.00 | \$23.70 | \$34.32 |
| Painter Sign Journeyman Tech/Team Leader Class C | \$21.25 | \$1.33 | \$0.14 | \$0.00 | \$0.82 | \$0.00 | \$0.57 | \$0.00 | \$0.00 | \$24.11 | \$34.74 |
| Painter Sign Journeyman Tech/Team Leader Class D | \$21.25 | \$1.33 | \$0.14 | \$0.00 | \$1.23 | \$0.00 | \$0.57 | \$0.00 | \$0.00 | \$24.52 | \$35.14 |
| Sign Journeyman Class A | \$20.98 | \$1.33 | \$0.14 | \$0.00 | \$0.00 | \$0.00 | \$0.56 | \$0.00 | \$0.00 | \$23.01 | \$33.50 |
| Sign Journeyman Class B | \$20.98 | \$1.33 | \$0.14 | \$0.00 | \$0.40 | \$0.00 | \$0.56 | \$0.00 | \$0.00 | \$23.41 | \$33.90 |
| Sign Journeyman Class C | \$20.98 | \$1.33 | \$0.14 | \$0.00 | \$0.81 | \$0.00 | \$0.56 | \$0.00 | \$0.00 | \$23.82 | \$34.31 |
| Sign Journeyman Class D | \$20.98 | \$1.33 | \$0.14 | \$0.00 | \$1.21 | \$0.00 | \$0.56 | \$0.00 | \$0.00 | \$24.22 | \$34.71 |
| Tech Sign Fabrication/ Erector Class A | \$15.90 | \$1.33 | \$0.14 | \$0.00 | \$0.00 | \$0.00 | \$0.43 | \$0.00 | \$0.00 | \$17.80 | \$25.75 |
| Tech Sign Fabrication/ Erector Class B | \$15.90 | \$1.33 | \$0.14 | \$0.00 | \$0.31 | \$0.00 | \$0.43 | \$0.00 | \$0.00 | \$18.11 | \$26.06 |
| Tech Sign Fabrication/ Erector Class C | \$15.90 | \$1.33 | \$0.14 | \$0.00 | \$0.61 | \$0.00 | \$0.43 | \$0.00 | \$0.00 | \$18.41 | \$26.36 |
| Tech Sign Fabrication/ Erector Class D | \$15.90 | \$1.33 | \$0.14 | \$0.00 | \$0.92 | \$0.00 | \$0.43 | \$0.00 | \$0.00 | \$18.72 | \$26.67 |

Special Calculation Note : Other is for paid holidays.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :
ADAMS, ALLEN, AUGLAIZE, BROWN, BUTLER,
CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON,
COLUMBIANA, COSHOCTON, CRAWFORD, DARKE,
DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE,
FRANKLIN, FULTON, GREENE, HAMILTON, HANCOCK,
HARDIN, HENRY, HIGHLAND, HOLMES, HURON,
JACKSON, KNOX, LICKING, LOGAN, LORAIN, LUCAS,
MADISON, MAHONING, MARION, MERCER, MIAMI,
MONTGOMERY, MORROW, MUSKINGUM, OTTAWA,
PAULDING, PERRY, PICKAWAY, PIKE, PREBLE,
PUTNAM, ROSS, SANDUSKY, SCIOTO, SENECA,
SHELBY, STARK, TRUMBULL, TUSCARAWAS, UNION,
VAN WERT, WARREN, WAYNE, WILLIAMS, WOOD,
WYANDOT

Special Jurisdictional Note :

Details :

Class A: less than 1 year.

Class B: 1-3 years.

Class C: 3-10 years.

Class D: More than 10 years.

Prevailing Wage Rate Skilled Crafts

Name of Union: Plasterer Local 132 (Cincinnati)

Change # : LCN01-2016fbLoc132

Craft : Plasterer Effective Date : 06/24/2016 Last Posted : 06/24/2016

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|----------------|---------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Plasterer | \$23.61 | | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$36.45 | \$48.25 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st 900 hours | 55.00 | \$12.99 | \$5.59 | \$0.00 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$19.68 | \$26.17 |
| 2nd 900 hours | 60.00 | \$14.17 | \$5.59 | \$0.00 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$20.86 | \$27.94 |
| 3rd 900 hours | 65.00 | \$15.35 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$28.19 | \$35.86 |
| 4th 900 hours | 70.00 | \$16.53 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$29.37 | \$37.63 |
| 5th 900 hours | 80.00 | \$18.89 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$31.73 | \$41.17 |
| 6th 900 hours | 85.00 | \$20.07 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$32.91 | \$42.94 |
| 7th 900 hours | 90.00 | \$21.25 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$34.09 | \$44.71 |
| 8th 900 hours | 95.00 | \$22.43 | \$5.59 | \$6.15 | \$0.50 | \$0.00 | \$0.60 | \$0.00 | \$0.00 | \$0.00 | \$35.27 | \$46.48 |

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

Ratio :

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

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, HAMILTON, HIGHLAND, WARREN

Special Jurisdictional Note :

Details :

Apprentice and Shop Hand Pension are \$1.00 less than Journeyman.

Prevailing Wage Rate Skilled Crafts

Name of Union: Plumber Pipefitter Local 392

Change # : LCN01-2019-fbLoc392

Craft : Plumber/Pipefitter Effective Date : 06/05/2019 Last Posted : 06/05/2019

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|-----------------------|----------------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Plumber Pipefitter | \$32.81 | | \$7.40 | \$12.39 | \$0.50 | \$0.00 | \$0.00 | \$0.98 | \$0.00 | \$0.00 | \$54.08 | \$70.48 |
| Plumber Helper | \$21.33 | | \$7.30 | \$6.59 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$35.72 | \$46.38 |
| Apprentice | Percent | | | | | | | | | | | |
| 1st yr | 46.50 | \$15.26 | \$7.20 | \$0.40 | \$0.50 | \$0.00 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$23.84 | \$31.46 |
| 2nd yr | 51.53 | \$16.91 | \$7.20 | \$0.40 | \$0.50 | \$0.00 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$25.49 | \$33.94 |
| 3rd yr | 56.53 | \$18.55 | \$7.20 | \$6.59 | \$0.50 | \$0.00 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$33.32 | \$42.59 |
| 4th yr | 61.53 | \$20.19 | \$7.20 | \$6.59 | \$0.50 | \$0.00 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$34.96 | \$45.05 |
| 5th yr | 76.53 | \$25.11 | \$7.20 | \$12.39 | \$0.50 | \$0.00 | \$0.00 | \$0.48 | \$0.00 | \$0.00 | \$45.68 | \$58.23 |

Special Calculation Note : OTHER IS: SUPPLEMENTAL UNEMPLOYMENT BENEFITS.

Ratio :

- 1 Journeymen to 1 Apprentice
- 2 Journeymen to 4 Apprentices
- 3 Journeymen to 6 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

BROWN, BUTLER, CLERMONT, HAMILTON, WARREN

When more than twenty (20) Journeymen are employed additional apprentices may be acquired at a ratio of one (1) apprentice to four (4) journeymen.

Special Jurisdictional Note :

Details :

Helpers shall be permitted to work on ONLY , Exterior Sewers, Concrete, Vitrified Clay or PVC Pipe and Digging and Backfilling for Piping Work. The ratio shall not exceed 2 helpers to 1 Journeymen when performing the scope of work listed above

Prevailing Wage Rate

Skilled Crafts

Name of Union: Roofer Local 42

Change # : LCNO2-2019fbLoc42

Craft : Roofer Effective Date : 09/19/2019 Last Posted : 09/19/2019

| | BHR | | Fringe Benefit Payments | | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|---------------------------|---------|---------|-------------------------|---------|---------|--------|---------|--------|------------------|----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Roofer | \$28.25 | | \$7.87 | \$7.55 | \$0.32 | \$0.00 | \$0.50 | \$0.06 | \$0.00 | \$0.00 | \$44.55 | \$58.67 |
| Tradesmen | \$22.60 | | \$7.87 | \$6.04 | \$0.00 | \$0.00 | \$0.50 | \$0.03 | \$0.00 | \$0.00 | \$37.04 | \$48.34 |
| Apprentice Percent | | | | | | | | | | | | |
| 1st period | 60.00 | \$16.95 | \$7.87 | \$4.53 | \$0.03 | \$0.00 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$29.88 | \$38.35 |
| 2nd period | 70.00 | \$19.77 | \$7.87 | \$5.28 | \$0.03 | \$0.00 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$33.46 | \$43.34 |
| 3rd period | 80.00 | \$22.60 | \$7.87 | \$6.04 | \$0.03 | \$0.00 | \$0.50 | \$0.00 | \$0.00 | \$0.00 | \$37.04 | \$48.34 |

Special Calculation Note : Other is Education and Safety.

Journeymen shall receive \$1.00 per hour above journeyman rate for work with pitch material.

Ratio :

Employer may employ 1 apprentice for every 2 journeymen in his employment.

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, BROWN, BUTLER, CLERMONT, HAMILTON, HIGHLAND, WARREN

Special Jurisdictional Note :

Details :

Any Tradesman Worker completing 2,000 hours in (2) years may move to Journeyman status by utilizing the Training Yard to improve their skills. Tradesman Workers will be tested at these yards to determine their competency for Journeyman status. Tradesman Workers must schedule and successfully complete the industry test battery in order to gain journeyman status.

Prevailing Wage Rate Skilled Crafts

Name of Union: Sheet Metal Local 24 (Dayton)

Change # : LCR02-2019fbLoc24(Day)

Craft : Sheet Metal Worker Effective Date : 06/19/2019 Last Posted : 06/19/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate |
|---------------------|----------------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | |
| Classification | | | | | | | | | | | |
| Sheet Metal Worker | \$27.72 | \$8.52 | \$14.46 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$51.55 | \$65.41 |
| Apprentice | Percent | | | | | | | | | | |
| Apprentice | | | | | | | | | | | |
| 5th Year B | 80.00 | \$22.18 | \$8.26 | \$11.56 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$42.85 | \$53.93 |
| 5th Year A | 75.00 | \$20.79 | \$8.20 | \$10.85 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.69 | \$51.09 |
| 4th Year B | 70.00 | \$19.40 | \$8.13 | \$10.13 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$38.51 | \$48.22 |
| 4th Year A | 65.00 | \$18.02 | \$8.07 | \$9.40 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$36.34 | \$45.35 |
| 3rd year B | 60.00 | \$16.63 | \$8.01 | \$8.68 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$34.17 | \$42.49 |
| 3rd Year A | 55.00 | \$15.25 | \$7.94 | \$7.95 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$31.99 | \$39.61 |
| 2 Year B | 53.78 | \$14.91 | \$7.90 | \$7.02 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$30.68 | \$38.13 |
| 2 Year A | 52.69 | \$14.61 | \$7.88 | \$6.49 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$29.83 | \$37.13 |
| Probationary 1 Year | 51.13 | \$14.17 | \$7.85 | \$5.87 | \$0.85 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$28.74 | \$35.83 |

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

Ratio :

1 Journeyman to 1 Apprentice then,
1 Apprentice for every 2 Journeymen thereafter

Jurisdiction (* denotes special jurisdictional note) :

ALLEN, AUGLAIZE, BUTLER, CHAMPAIGN,
CLARK, CLINTON, DARKE, GREENE, HARDIN,
LOGAN, MERCER, MIAMI, MONTGOMERY,
PREBLE, SHELBY, VAN WERT, WARREN,
WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Sprinkler Fitter Local 669

Change # : LCN02-2019fbLoc669

Craft : Sprinkler Fitter Effective Date : 01/22/2020 Last Posted : 01/22/2020

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Sprinkler Fitter | \$39.07 | | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$5.12 | \$0.10 | \$0.00 | \$0.00 | \$61.84 | \$81.37 |
| Apprentice Indentured after April 1, 2013 | Percent | | | | | | | | | | | |
| CLASS 1 | 45.00 | \$17.58 | \$7.75 | \$0.00 | \$0.52 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$0.00 | \$25.95 | \$34.74 |
| CLASS 2 | 50.00 | \$19.53 | \$7.75 | \$0.00 | \$0.52 | \$0.00 | \$0.00 | \$0.10 | \$0.00 | \$0.00 | \$27.91 | \$37.67 |
| CLASS 3 | 55.00 | \$21.49 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.65 | \$0.10 | \$0.00 | \$0.00 | \$39.79 | \$50.53 |
| CLASS 4 | 60.00 | \$23.44 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.65 | \$0.10 | \$0.00 | \$0.00 | \$41.74 | \$53.46 |
| CLASS 5 | 65.00 | \$25.40 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$43.95 | \$56.64 |
| CLASS 6 | 70.00 | \$27.35 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$45.90 | \$59.57 |
| CLASS 7 | 75.00 | \$29.30 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$47.85 | \$62.50 |
| CLASS 8 | 80.00 | \$31.26 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$49.81 | \$65.43 |
| CLASS 9 | 85.00 | \$33.21 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$51.76 | \$68.36 |
| CLASS 10 | 90.00 | \$35.16 | \$10.23 | \$6.80 | \$0.52 | \$0.00 | \$0.90 | \$0.10 | \$0.00 | \$0.00 | \$53.71 | \$71.29 |

Special Calculation Note : \$0.10 for Other is National Fire Sprinkler Association

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW,

MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Sprinkler Fitter work shall consist of the installation, dismantling, maintenance, repairs, adjustments, and corrections of all fire protection and fire control systems including the unloading, handling by hand, power equipment and installation of all piping or tubing, appurtenances and equipment pertaining thereto, including both overhead and underground water mains, fire hydrants and hydrant mains, standpipes and hose connections to sprinkler systems used in connection with sprinkler and alarm systems. Also all tanks and pumps connected thereto, also included shall be CO-2 and Cardox Systems, Dry Chemical Systems, Foam Systems and all other fire protection systems.

Prevailing Wage Rate Skilled Crafts

Name of Union: Truck Driver Bldg & Hwy Class 1
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : OCRO1-2019fbBldgHwy

Craft : Truck Driver Effective Date : 09/11/2019 Last Posted : 09/11/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|----------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | | | MISC (*) |
| Classification | | | | | | | | | | | | |
| Truck Driver CLASS 1 4 wheel service, dump, and batch trucks, Oil Distributor - Asphalt Distributor-Tandems | \$28.04 | | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.14 | \$57.16 |
| Apprentice | Percent | | | | | | | | | | | |
| First 6 months | 80.00 | \$22.43 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.53 | \$48.75 |
| 7-12 months | 85.00 | \$23.83 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$38.93 | \$50.85 |
| 13-18 months | 90.00 | \$25.24 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.34 | \$52.95 |
| 19-24 months | 95.00 | \$26.64 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$41.74 | \$55.06 |
| 25-30 months | 100.00 | \$28.04 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.14 | \$57.16 |

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

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN,

HARRISON, HENRY, HIGHLAND, HOCKING,
HOLMES, HURON, JACKSON, JEFFERSON,
KNOX, LAWRENCE, LICKING, LOGAN,
LORAIN, LUCAS, MADISON, MAHONING,
MARION, MEDINA, MEIGS, MERCER, MIAMI,
MONROE, MONTGOMERY, MORGAN,
MORROW, MUSKINGUM, NOBLE, OTTAWA,
PAULDING, PERRY, PICKAWAY, PIKE,
PORTAGE, PREBLE, PUTNAM, RICHLAND,
ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY,
STARK, SUMMIT, TRUMBULL, TUSCARAWAS,
UNION, VAN WERT, VINTON, WARREN,
WASHINGTON, WAYNE, WILLIAMS, WOOD,
WYANDOT

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive \$0.20 cents per hour above their Basic Hourly Rate.

Prevailing Wage Rate Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 2
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCRO1-2019-fbBldgHevHwy

Craft : Truck Driver Effective Date : 10/16/2019 Last Posted : 10/16/2019

| | BHR | | Fringe Benefit Payments | | | | | Irrevocable Fund | | Total PWR | Overtime Rate | |
|---|---------|---------|-------------------------|---------|---------|--------|---------|------------------|-----------|-----------|---------------|---------|
| | | | H&W | Pension | App Tr. | Vac. | Annuity | Other | LECET (*) | MISC (*) | | |
| Classification | | | | | | | | | | | | |
| Truck Driver CLASS 2 Tractor Trailer-Semi Tractor Trucks-Pole Trailers-Ready Mix Trucks-Fuel Trucks-Asphalt-Oil Spray bar men- 5 Axle & Over -Belly Dumps-End Dumps-Articulated Dump Trucks- Low boys- Heavy duty Equipment (irrespective of load carried) when used exclusively for transportation- Truck Mechanics (when needed) | \$28.46 | | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.56 | \$57.79 |
| Apprentice | Percent | | | | | | | | | | | |
| First 6 months | 80.00 | \$22.77 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$37.87 | \$49.25 |
| 7-12 months | 85.00 | \$24.19 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$39.29 | \$51.39 |
| 13-18 months | 90.00 | \$25.61 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$40.71 | \$53.52 |
| 19-24 months | 95.00 | \$27.04 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$42.14 | \$55.66 |
| 25-30 months | 100.00 | \$28.46 | \$7.00 | \$7.90 | \$0.20 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$0.00 | \$43.56 | \$57.79 |

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

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

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

Special Jurisdictional Note :

Details :

** Asphalt - Oil spray bar man when operating from cab shall receive \$0.20 cents per hour above their Basic Hourly Rate.

SECTION 00 70 20
PERMITS

Contractor shall keep a copy of all permits at the project site throughout the duration of the work.

SECTION 00 70 30
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

The Warren County Water and Sewer Department has adopted the Standard General Conditions of the Construction Contract prepared by the Engineers Joint Contract Documents Committee and issued and published jointly by the American Consulting Engineers Council, the National Society of Professional Engineers, and the American Society of Civil Engineers. This document, contained herein, shall be made part of the Contract and shall be used during the performance of the work, except as modified by the following SECTION 00 80 10 Supplemental 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 Law.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly By



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

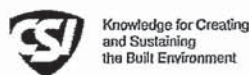
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The Associated General Contractors of America



Construction Specifications Institute

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American Council of Engineering Companies
1015 15th Street, N.W., Washington, DC 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4400

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor Nos. C-520 or C-525 (2002 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 EJCDC Construction Documents, General and Instructions (No. C-001) (2002 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (No. C-800) (2002 Edition).

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GENERAL CONDITIONS

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's 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.A 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. The General Requirements pertain to all sections 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 in connection with the Work.

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. *Related Entity* -- An officer, director, partner, employee, agent, consultant, or subcontractor.

37. *Resident Project Representative*--The authorized representative of Engineer who may be assigned to the Site or any part thereof.

38. *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.

39. *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.

40. *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.

41. *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.

42. *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.

43. *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.

44. *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.

45. *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.

46. *Successful Bidder*--The Bidder submitting a responsive Bid to whom Owner makes an award.

47. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

48. *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 any Subcontractor.

49. *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.

50. *Unit Price Work*--Work to be paid for on the basis of unit prices.

51. *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.

52. *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 following words or terms are not defined but, when used in the Bidding Requirements or Contract Documents, have the following 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 requirements of and information in the Contract Documents and conformance with the design concept of the completed 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 which 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*

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.

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 may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended 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, or Engineer, or any of their Related Entities, 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 may discover 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 any provision of any Law or Regulation applicable to the performance of the Work or of any standard, specification, manual or code, or of any instruction of any Supplier, 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 knew or reasonably should have known 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, code, or instruction (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 or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, 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 Engineer's consultants, including electronic media editions; or

2. reuse any of 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 adaption by Engineer.

B. The prohibition 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. Copies of data furnished by Owner or Engineer to Contractor or 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 of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and
2. those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) that Engineer has used in preparing the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the general 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 Related Entities 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 at or contiguous to the Site 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, Owner and Engineer, and any of their Related Entities 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.

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; 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:* Reference is made to the Supplementary Conditions for the identification of those reports and drawings relating to a Hazardous Environmental Condition identified at the Site, if any, that have been utilized by the Engineer in the preparation of the Contract Documents.

B. *Limited Reliance by Contractor on Technical Data*

Authorized: Contractor may rely upon the general 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 Related Entities 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.

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 to Contractor written notice:

(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, 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 4.06G 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, 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 current 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 must be accompanied by a certified copy of the agent's authority to act.

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 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 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.

5.04 *Contractor's Liability Insurance*

A. Contractor shall purchase and maintain such liability and other 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, include as additional insured (subject to any customary exclu-

sion 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, 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 completed operations insurance;

4. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;

5. 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);

6. 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

7. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment.

a. 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, 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 an insured or additional insured;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, 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 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 additional insured to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such boiler and machinery 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, 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 an insured or additional insured.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with 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 additional insured 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 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 to be listed as insureds or additional insureds (and the officers, directors, 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 additional insureds thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, 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 to be listed as insured or additional insured (and the officers, directors, 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, 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, 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 insureds, 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. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

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,

3) it has a proven record of performance and availability of responsive service; and

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 that 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 in 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 or not 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 or not 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;

4) and 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 either a Change Order for a substitute or 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

item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the 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 anything in the Contract Documents 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 an additional insured 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, and Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds (and the officers, directors, 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, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, 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 primary 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, 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. 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. 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 , 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).

D. 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 acceptable 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*: Contractor shall also submit Samples to Engineer for review and approval in accordance with the acceptable schedule of Shop Drawings and Sample submittals.

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 determined and verified:

a. all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

b. the suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;

c. all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

d. shall also have 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.

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 Drawing's 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 Related Entities 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, 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 respective consultants, agents, officers, directors, partners, or employees 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, 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 via 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, a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and shall 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 their work and will only cut or alter their 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 actions or inactions.

C. Contractor shall be liable to Owner and any other contractor for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's 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 in respect of 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 in or relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner's responsibilities, if any, in 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 in 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. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

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 and will not be changed without written consent of Owner and Engineer.

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 believe 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.

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.B.

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 notice 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) is required by the provisions of any bond to be given to a surety, 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 Time 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 include only the following items, and shall not include any of the costs itemized in Paragraph 11.01.B.

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 at the Site. 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, 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, expresses, 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 and 11.01.B.

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 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 Paragraph 12.01.C.2.a 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 the Related Entities of each of them 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. All 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, inspecting, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's Site 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 said 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, it must, if requested by Engineer, be uncovered 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 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 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 on the Site 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, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and to 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. that 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 corrects to Owner's satisfaction the reasons for such action.

3. If it is subsequently determined 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.

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 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 will certify to Owner and Engineer that such part of the Work is substantially complete and request Engineer to issue

a certificate of Substantial Completion 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.7;

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 or Owner's property might in any way be responsible 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 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 their 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.

SECTION 00 80 10
SUPPLEMENTAL CONDITIONS

PART 1 GENERAL

1.1 GENERAL

- A. These Supplementary Conditions shall modify and supplement the Standard General Conditions of the Construction Contract (Section 00 70 30, EJCDC C-700), and shall govern whenever they conflict. All provisions which are not so amended or supplemented remain in full force and effect.

1.2 MODIFICATIONS TO ARTICLES OF THE GENERAL CONDITIONS

A. ARTICLE 1 – DEFINITIONS

1. Paragraph 1.01.A.19 is supplemented with the following: Where the term “Engineer” is used in the Specification for the approval of materials or work, it shall be understood to mean Warren County Water & Sewer. Contractor acknowledges that Engineer is a full-time employee appointed by Owner, and Engineer is not an independent third party, rather is a department of the governmental entity of Owner (Warren County Board of Commissioners) a political subdivision of Ohio.
2. Paragraph 1.01.A.29 is supplemented with the following: Whenever the term “Owner” is used in the Contract Documents, it shall refer to Warren County Board of Commissioners on behalf of Warren County Water & Sewer, or its authorized representative.

B. ARTICLE 2 – PRELIMINARY MATTERS

1. Paragraph 2.03 – Commencement of Contract Time: Notice to Proceed is amended as follows: Delete the last sentence.

C. ARTICLE 4 – AVAILABILITY OF LANDS; SURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

1. Paragraph 4.06(G) shall be deleted.

D. ARTICLE 5 – BONDS AND INSURANCE

1. Paragraph 5.01.A – Amend the second sentence to read: “ ...These bonds shall remain in effect not less than 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”

2. Paragraph 5.01.D – Add the following paragraph:

“D. If the Contractor provided a certified or cashier’s check or letter of credit as Bid Security, he shall furnish a Performance Bond in an amount at least equal to 100% of the Contract Price as security for the faithful performance of this agreement.”

3. Paragraph 5.04.C – Add the following new paragraph immediately after 5.04.B:

“C. The Contractor shall, at his own expense, purchase and maintain the following minimum coverage:

1. Workers Compensation, for claims for bodily injury, sickness, disease or death as follows:
 - a. Coverage A Statutory Benefits as described by the applicable law.
 - b. Coverage B Employer’s Liability
 - i. \$500,000 Bodily Injury by Accident – each employee
 - ii. \$500,000 Bodily Injury by disease – each employee
 - iii. \$500,000 Bodily Injury by disease – policy limit

The Contractor shall provide a copy of a certificate of premium payment from the Industrial Commission and Bureau of Workers Compensation, State of Ohio, for the period of time specified during which construction commences and copies of renewal certificates for subsequent periods, so long as the project continues.

2. Comprehensive General Liability Coverage for Bodily Injury and Property Damage – occurrence form.

| | | |
|---|-------------|---|
| General Aggregate | \$2,000,000 | Each occurrence, combined single limit for Bodily Injury and Property Damager |
| Products – Completed Operations | \$1,000,000 | Each occurrence |
| Aggregate | \$2,000,000 | |
| Personal and Advertising Liability per Occurrence | \$1,000,000 | Combined Single Limit for Bodily Injury and Property Damager |

Coverage shall be extended to include the following:

- a. Per project and per location aggregate.
- b. Premises and operations coverage.
- c. Coverage for liability and independent contractors.
- d. Products and completed operations.

- e. Coverage for explosion, collapse and underground hazards.
- f. Stop-Gap Liability: All monopolistic states - \$1,000,000.
- g. Owner as additional insureds.
- h. Waiver of Subrogation against Owner
- i. 60-Day Notice of Cancellation or material change.

3. Comprehensive Automobile Liability Insurance – Occurrence Form

| | | |
|----------------|-------------|--|
| Any Automobile | \$1,000,000 | Bodily Injury and Property Damage, Combined Single Limit |
|----------------|-------------|--|

| | | |
|---------------------|-------------|--|
| Borrowed, Non-Owned | \$1,000,000 | Bodily Injury and Hired Automobile Property Damage, Combined Single Limit |
|---------------------|-------------|--|

Coverage shall be extended to include:

- a. Contractual liability for assumed liability.
- b. Owner as additional insureds.
- c. Waiver of Subrogation against Owner
- d. 60 Day Notice of Cancellation or material change.
- e. Motor Carrier Act Endorsement MCS-90
- f. Extra Wide/Extra Heavy Hauling Permit Endorsement

4. Any Umbrella Liability or Excess Liability Policy over primary comprehensive General and Automobile Liability shall be carried in a minimum amount of:

\$5,000,000 Each Occurrence
\$5,000,000 Aggregate

The Umbrella or Excess Policy shall be following the form of:

- a. Any Additional Insured under primary policy.
- b. Per project and per location aggregates.
- c. Explosion, Collapse, or Underground Hazards
- d. Stop-Gap Liability
- e. Waiver of Subrogation against Owner.
- f. Watercraft (when employed to perform the work).
- g. Aircraft (when employed to perform the work).
- h. 60-Day Notice of Cancellation or material change.

4. Paragraph 5.06 – *Property Insurance* – shall be DELETED in its entirety.

D. ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

1. Paragraph 6.01.A – After the first sentence add: “Contractor’s Work shall be performed according to the standards of care normally exercised by construction organizations within Ohio that are engaged in performing comparable services devoting such attention thereto and applying such skills as may be necessary to perform the work in accordance with the Contract Documents.”
2. Paragraph 6.02.C – Add a new paragraph as follows:
 - “C. If the Contractor does not perform the work in accordance with the Contractor’s construction schedule and the project construction schedule, and it becomes apparent that the work may not be completed within the contract times, the Contractor shall, at no additional cost to the Owner, as necessary to improve the Contractor’s progress: (a) increase the number of employees in such crafts as will regain lost scheduled progress; and (b) increase the number of working hours per shift, shifts per work day, working days per week, the amount of equipment, or any combination of the foregoing measures to regain lost scheduled progress. Contractor shall furnish such employees, materials, facilities, and equipment, and shall work such hours, including extra shifts, overtime operations, and Sundays and holidays, as may be necessary to insure the prosecution and completion of the work in accordance with the Contractor’s construction schedule and the project construction schedule.”
3. Paragraph 6.02.D – Add a new paragraph as follows:
 - “D. Contractor shall at all times maintain good discipline and order at the site. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them. If the Owner deems any employee of the Contractor or a subcontractor unsatisfactory, the Contractor must transfer or require its subcontractor to transfer such employee from the project immediately.”
4. Paragraph 6.05(E) - shall be deleted.
5. Paragraph 6.08 – Replace this Paragraph with the following:
 - “A. Permit requirements are specified in Section 0020 00 – INSTRUCTIONS TO BIDDERS, and 00 70 20 – PERMITS.
6. Paragraph 6.10 – Taxes, is amended as follows:
 - “A. OWNER, being a public body, is exempt from taxes on material incorporated into the work. CONTRACTOR, therefore, is not required to pay such materials taxes. The OWNER will provide the tax

exemption forms. These forms are to contain all necessary information required by the State. CONTRACTOR shall be responsible for payment of any applicable commercial activity tax.

- B. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated to the Work.
- C. Contractor is specifically required to abide by all local tax requirements, if any, including income tax requirements to withhold at source. Contractor acknowledges that the Contract work may take place in various cities and taxing districts, and further acknowledges different tax burdens may be imposed by each. Contractor shall indemnify, defend, and hold Owner harmless for any federal, state, or local tax liabilities incurred as a result of Contractor performing the Work."

- 6. Paragraphs 6.13 and 6.14 – Safety and Protection, are supplemented with the following: "All construction work under this Agreement is subject to Chapter XVII of Title 29, Code of Federal Regulations (CFR) Part 1926 (formerly Chapter XVII of Title 29, Part 1518) titled, "Safety and Health Regulations for Construction" and subsequent amendments."

E. ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

- 1. Paragraph 9.01 – Add the following sentence: The parties acknowledge and agree that ENGINEER is a full time employee of OWNER and is not an independent third party, however, ENGINEER shall perform any duties under this agreement in good faith and adhere to a standard of professional care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality.

F. ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

- 1. Paragraph 10.03.A.4 – Add the following paragraph:
 - “4. In no event is the Contractor entitled to reserve any rights or take other similar action with respect to a change order if the effect or intent of such reservation or action would be to accommodate a further adjustment in the contract times, contract price, or both, after the Contractor executes the change order. By executing a change order, the Contractor irrevocably certifies that the elements of the change order described are completely satisfied and waives all rights to seek further adjustment of the contract times, contract price, or both, at a later date with respect to the associated change in the work.”

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

1. Paragraph 11.01(A)(3) – Amend the Second Sentence as follows: DELETE the phrase “If required by Owner”. Add Sentence OWNER requires CONTRACTOR to competitively bid work from subcontractors.

2. Paragraph 11.01(D) Add the following Sentence: This agreement shall be subject to open book pricing, CONTRACTOR shall make any all bids, invoices, receipts, any and all documentation for expenses and costs available for inspection by OWNER immediately upon request.

Paragraph 11.01.B.1 – Add project manager and project executive to the list of excluded compensation and payroll costs.

E. ARTICLE 12 – CHANGE OF CONTRACT PRICE, CHANGE OF CONTRACT TIMES

1. Paragraph 12.01.C.2.e – Add the following to the end of paragraph 12.01.C.2.e: “Any change that results in a net decrease in cost shall include the appropriate overhead and profit added thereto calculated as set forth in ARTICLE 12 of the General Conditions.”

2. Paragraph 12.01.D – Insert new paragraph as follows: “D. In no event shall Contractor be entitled to any increase in the Contract Price on account of any adverse weather.”

3. Paragraph 12.02.B – Replace Paragraph 12.02.B with the following:

“B. If the Contractor wishes to make a claim for an increase in contract times, prompt written notice as provided herein shall be given. The Contractor’s claim shall include an estimate of cost and of probable effect of delay on progress of the work, a detailed schedule which indentifies the critical portions of the work impacted by the delaying event and the dates of such impact, and a statement from Contractor that the increase requested is the entire increase in the contract time associated with the claim. The failure to provide such information and statement within the time period established in Paragraph 10.05.B shall constitute an irrevocable waiver of the claim. In the case of a continuing delay occurring on consecutive days, only one claim is necessary, provided, however, that within ten (10) days of the cessation of the cause of the continuing delay, the Contractor shall notify the Owner in writing that the cause of the delay has ceased. The failure to give notice of the cessation of the cause of the continuing delay shall constitute an irrevocable waiver of any claim based upon the continuing delay.”

4. Add the following paragraph as Paragraph 12.02.C:

“In addition to the requirements of Paragraph 12.02.B, if adverse weather conditions are the basis for a claim for additional time, the contractor shall support such claim with data acceptable to the Owner and Engineer that substantiates that weather conditions were significantly abnormal for the period

of time and could not have reasonably been anticipated and that weather conditions had an adverse effect on a critical element of the scheduled construction. Notwithstanding any other provisions of the Contract Documents to the contrary, the project times will not be adjusted on account of the impact of an normal adverse weather or any of the work or on account of the impact of any abnormal adverse weather on non-critical elements of the work. The support for the evaluation of all adverse-weather claims resulting in lost work days shall be based upon criteria as provided for in the State of Ohio Department of Transportation (ODOT) Construction and Material Specifications dated January 1, 2013. ODOT Specification 108.06.C lists the number of days that the Contractor may expect to be lost due to weather as follows:

| Month | Number of Days Lost Due to Weather |
|--------------|---|
| January | 8 |
| February | 8 |
| March | 7 |
| April | 6 |
| May | 5 |
| June | 5 |
| July | 4 |
| August | 4 |
| September | 5 |
| October | 6 |
| November | 6 |
| December | 6 |

5. Paragraph 12.03.F – Add new paragraph as follows:

“F. Any proposed time extensions for delays requested because of abnormal weather conditions shall be subject to Paragraph 12.02.C.”

6. Paragraph 12.03.G. – Add new paragraph as follows:

“G. Delays beyond the substantial completion date attributable to and within the control of the Contractor, their Subcontractor, or Supplier shall be subject to liquidated damages in the amounts specified in SECTION 00 60 10 – CONTRACT.”

F. ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

1. Paragraph 15.01.A. – Delete the sentence that states: “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.

REPLACE the above sentence with the following: Contractor shall be granted an extension of the Contract Times directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

2. Paragraph 15.03.A(3) – shall be DELETED in its entirety.

G. ARTICLE 14 – PAYMENT TO CONTRACTOR AND COMPLETION

1. Add new Paragraph 14.02.A.4 as follows:

“4. In accordance with ORC Section 153.12 partial payments to the Contractor for labor performed under either a unit or lump sum price contract shall be made at the rate of ninety-two per cent of the estimates prepared by the Contractor and approved by the Engineer. All labor performed after the job is fifty percent completed shall be paid for at the rate of one hundred per cent of the estimates submitted by the Contractor and approved by the Engineer. A Contract shall be considered 50 percent complete when the Contractor has been paid an amount equal to 50 percent of the total cost of the labor of the Contract and 50 percent of the total cost of the material of the Contract.

All materials furnished and delivered but not actually included in the construction and approved by the Owner, after the work under this contract is 50 percent complete, shall be paid for at the rate of 92 percent of the invoiced value of the materials. The balance of such estimates shall be paid when the material is incorporated into and becomes a part of the building construction.

When the major portion of the project is substantially completed and occupied, or in use, or otherwise accepted, and there exists no other reason to withhold retainage, the retained percentages held in connection with such portion shall be released and paid to the contractor, withholding only that amount necessary to assure completion.

All retained payments shall be deposited into an escrow account at the 1st National Bank, 1160 E. Main Street, Lebanon Ohio (513) 932-3221, Contact: Gail Haines. The Contractor may waive their right to deposit the payments in an escrow account by written request to the Owner. Retained payments not deposited into an escrow account will be held by the Owner for future payment to the Contractor.”

2. Amend Paragraph 14.02.C to read: “Thirty days after presentation”

G. ARTICLE 16 – DISPUTE RESOLUTION

1. Delete Paragraphs 16.01.A, 16.01.B, and 16.01.C and replace with the

following:

“1. This Contract shall be construed under the laws of the State of Ohio, and the parties hereby stipulate to the venue for any and all claims, disputes, interpretations, litigation of any kind arising out of this Contract being exclusively in the Warren County, Ohio Court of Common Pleas (unless both parties mutually agree in writing to alternate dispute resolution), as well as waiving any right to bring or remove such matters in or to any other state or federal court.”

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

APRIL 2020

**WARREN COUNTY
WATER AND SEWER DEPARTMENT**

**LOWER LITTLE MIAMI
WASTE WATER TREATMENT PLANT
IMPROVEMENTS PROJECT**

Technical Specifications

April 2020

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **General.** Provide all labor, materials, tools, and equipment necessary to construct the project in accordance with the contract drawings and as specified herein.
- B. **The WWTP upgrade project generally consists of** replacing two mechanically-cleaned screens and two screenings compactors; replacing two secondary clarifier drives; replacing two secondary clarifiers' internal components complete; replacing a set of vertical loop reactor turning vanes; replacing a sludge holding tank aeration blower; and corresponding electrical, control, piping, site (mainly paving and asphalt resurfacing) and appurtenance upgrades to be installed within and around new and existing facilities. Recommissioning the existing abandoned 18-inch force main from the Old Foster Pump Station for use as a backup forcemain for the New Foster Pump Station is also part of the project.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in compliance with all federal, state, and local codes.

1.4 SUBMITTALS

- A. **Submittal Requirements.** See General Conditions for required submittals and for procedures necessary for transmittal of submittals.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

- A. **Warranty Requirements.** Provide as specified in Divisions 40 and 44.

1.8 OWNER FURNISHED ITEMS

- A. **General.** The Owner will provide control system and existing utility coordination.

PART 2 – PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 SEQUENCE OF CONSTRUCTION AND OPERATION

- A. **Maintain current influent screening** capabilities as the new equipment is installed, existing utilities are reconnected, and the new equipment is tested. One replacement screen and compactor pair shall be installed, tested, and accepted by the Owner before removal of the second existing screen and compactor can be initiated.
- B. **Both existing Clarifiers 1 and 2** can be upgraded simultaneously, starting with demolition and concluding with testing, training, and acceptance by Owner.
- C. **Both existing Clarifiers 3 and 4** can be upgraded simultaneously, starting with drive mechanism removal and concluding with testing, training, and acceptance by Owner.
- D. **Vertical loop reactor** component replacement can be conducted concurrently with screening and clarifier upgrade tasks.
- E. **Sludge storage tank aeration blower** replacement can be conducted concurrently with screening, clarifier, and vertical loop reactor upgrade tasks. Two blowers shall remain operational at all times.
- F. **Site work**, particularly site paving and existing asphalt surface sealing, shall be coordinated with WWTP operations staff, starting with 48-hour notice before resurfacing work starts and after it starts, on a daily basis over the duration of the task to insure necessary vehicle movements to onsite WWTP facilities and access road traffic are not disrupted during critical times of the work day.
- G. **Foster Pump Station Force Main Improvements** can be conducted currently with all the work performed on the WWTP site. Tasks included pressure testing the existing 18-inch and new 18-inch piping prior to connection to existing 24-inch. Construct all piping prior to ties-in connections. Tie-in at WWTP location shall be made first and shall utilize a vented plug at the 24-inch discharge location. The tie-in to the 24-inch forcemain shall be made within a 2-hour duration during dry weather and low flow conditions as dictated by the Owner.

After tie-in is complete at WWTP location, set up temporary by-pass connection from the pump station to the 18-inch force main so the 24-inch force main can be slowly drained to the wet well and the tie-in connection 24-inch at the pump station can be made. All tie-ins shall be made during dry weather and low flow conditions and coordinated with County staff. Contractor shall provide 48-hour notice to the Owner prior to any tie-ins.

END OF SECTION

SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, materials, tools, and equipment necessary, temporary or permanent, required to construct the project and improvements in accordance with the drawings and specifications, including the work restrictions specified herein.

1.3 QUALITY ASSURANCE

Not used.

1.4 SUBMITTALS

- A. **Written Notice.** Submit a written notice to the OWNER 72 hours in advance of any cut-in that requests consent to proceed, including:
 - 1. Description of affected work and work areas of the facility.
 - 2. Effect on other work and on structural integrity and safety of the project.
 - 3. Description of the proposed work including:
 - a. Scope of connection.
 - b. Contractor and trades to execute work.
 - c. Products proposed to be used.
 - d. Schedule of operations including required downtime for any of the Owner's facilities, starting time, duration, and completion.

1.5 JOB CONDITIONS

- A. **General Requirements.** It is imperative that existing facilities remain functional during the construction unless noted otherwise in the Contract Documents.
- B. **Coordination**
 - 1. Coordinate the work of all subcontractors, crafts, and trades engaged in the work.
- C. **Site Accessibility**
 - 1. Keep driveways and entrances clear and available to the Owner at all times.
 - 2. Do not use these areas for parking or storage.

3. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

D. Noise, Dust, and Odor Control

1. Conduct all construction activities to minimize all unnecessary noise, dust, and odors.
2. Do not use oil, or other materials which may cause tracking through the nearby neighborhood, to control dust.

E. Specific Requirements

1. Meet with the Engineer/Architect and Owner to determine which systems or facilities must be maintained in use or operation and to determine the acceptable timing of shutdowns.
2. The Owner has the authority to stop or prohibit work which would interfere with or jeopardize the continuous operation of the facility.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification

1. Confirm all requirements, conditions, dimensions, and time intervals prior to beginning actual construction in any given area.
2. Confirm that the conditions have not changed since preparation, submission, and approval of the shut down plan.
3. Notify the OWNER prior to commencing the connection if the proposed work is incompatible or incomplete.

3.2 REQUIREMENTS

A. Sequences and Interferences

1. Since alterations, additions, and tie-ins are included in this work that potentially could interfere with the existing facilities' function, Contractor shall take all steps necessary to maintain the ability to provide continuous and full treatment to insure NPDES permit compliance. Complete as much work as possible before making tie-ins or switchovers.
2. Install and start-up new components prior to removal of the existing components from service.
3. Install and maintain temporary parallel components until service is restored.
4. When interferences are unavoidable by the above methods, take the following additional steps:

LLMWWTP IMPROVEMENTS

- a. Schedule the work so as to minimize the time interval and frequency that any critical facility or component is out of service.
- b. Coordinate all labor, materials, and equipment to be on the site at the start of a shutdown.
- c. Work continuously (24 hours per day, 7 days per week) until service is restored.
- d. Schedule the work to correspond with minimum demands on any system or facilities. This may include weekend or evening work.
- e. Notify the Owner in writing 72 hours in advance of a shutdown so that the Owner can make the necessary preparations.
 - 1) Signed Notice. Each written notice must be signed by the OWNER prior to the start of work.
 - 2) Notify the OWNER when connection has been completed and normal operations can resume.
- f. Shutdown Time.
 - 1) Allow for a minimum of 7 day window (float time) per shutdown when assembling connection schedule. Owner will use this window only to maintain or ensure continuous plant operation during critical operating conditions.
 - 2) If the scope of the connection requires the shutdown of all or part of the facility, work continuously around the clock to complete the connection and return the facility to normal operations.

B. Construction Compliance

1. The OWNER will judge the practicality of compliance with this specification in any given situation.
2. The OWNER will approve the shutdown plan in the written notice only. Any deviations from the proposed plan will require further review and approval.
3. Furnish all labor, equipment, and materials, temporary or permanent, required for compliance at no additional cost to the Owner.

- C. **Existing Units.** The Owner's personnel shall operate all existing valves, gates, and equipment required for the work to be completed. Many of the existing gates and valves are old and some may not seal properly. Contractor shall coordinate with Owner's personnel prior to attempting any such closure and provide any corrective measure or temporary equipment or facilities necessary to attain the shut-off needed to perform the work at no additional cost to the Owner.

3.3 **DEMONSTRATION**

- A. **Records and Responsibility.** Maintain all approved schedules, sequences of construction, copies of communications of all coordination, and other information as required at the construction site. Designate a single point of coordination in one responsible individual.

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. **General.** Provide the labor and materials necessary to attend and participate in project meetings in accordance with the plans and as specified herein.

B. **Conferences and Meetings.** This section specifies administrative and procedural requirements for project meetings including but not limited to:

- 1. Preconstruction conference.
- 2. Progress meetings.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION CONFERENCE

A. **Schedule.** The OWNER will schedule and conduct a preconstruction conference and organizational meeting at the project site or other convenient location after execution of the agreement and prior to commencement of construction activities. No work shall commence prior to the meeting.

B. **Attendees.** The OWNER, the Prime Contractors and their superintendents, major subcontractors, manufacturers, suppliers, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conduct matters relating to the work.

C. **Agenda.** Discuss items of significance that could affect progress including such topics as:

- 1. Tentative construction schedule.
- 2. Critical work sequencing.
- 3. Designation of responsible personnel.
- 4. Procedures for processing field decisions and Change Orders.
- 5. Procedures for processing Applications for Payment.
- 6. Distribution of Contract Documents.
- 7. Submittal of shop drawings, product data, and samples.
- 8. Preparation of record documents.
- 9. Use of the premises.

10. Office, work, and storage areas.
11. Equipment deliveries and priorities.
12. Site safety.
13. Security.
14. Housekeeping.
15. Working hours.
16. Others as appropriate.

D. **Minutes.** Within 7 days of the preconstruction conference, the OWNER shall distribute minutes to all attendees.

3.2 **PROGRESS MEETINGS**

A. **Schedule.** The OWNER shall conduct progress meetings at the project site on a monthly basis at regularly scheduled intervals. Coordinate dates of meetings with preparation of the monthly payment requests.

B. **Attendees.** In addition to representatives of the OWNER and all Prime Contractors, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the project and authorized to conclude matters relating to progress.

C. **Agenda.** Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.

1. Contractor's Construction Schedule.

- a. Review progress since the last meeting.
- b. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead of or behind schedule.
- c. Determine how construction behind schedule will be expedited.
- d. Secure commitments from parties involved to do so.
- e. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the contract time.

2. Review the present and future needs of each entity present, including such items as:

- a. Interface requirements.
- b. Completion times.
- c. Preferred sequences.
- d. Delivery schedule.
- e. Off-site fabrication problems.
- f. Access issues.
- g. Site utilization.
- h. Temporary facilities and services.
- i. Hours of work.
- j. Hazards and risks.

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- k. Housekeeping.
 - l. Quality and work standards.
 - m. Change Orders.
 - n. Documentation of information for payment requests.
- D. **Schedule Updating.** The General Construction Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and submit the revised schedule within 3 days of each progress meeting for distribution with the minutes.
- E. **Minutes.** Within 7 days of the progress meeting, the OWNER shall distribute minutes to all attendees.

END OF SECTION

SECTION 01 32 16

SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Perform the work necessary to provide a Critical Path Method (CPM) schedule for all work in accordance with the drawings and as specified herein.
- B. **Requirements.** This section specifies administrative and procedural requirements for the CPM of scheduling and reporting progress of the work.
1. Refer to General Conditions and the Agreement for definitions and specific dates of Contract Time.
 2. In case of multiple Contractors, the General Contractor shall prepare the CPM schedules. All other Contractors must submit and coordinate activities.

1.3 QUALITY ASSURANCE

- A. **Program.** Use a computer software program for network analysis that has been developed specifically to manage CPM construction schedules and is acceptable.
- B. **Standards.** Comply with procedures contained in "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry," published by The Associated General Contractors of America.

1.4 DEFINITIONS

- A. **Critical Path Method.** CPM is a construction scheduling technique using network analysis diagrams to plan and organize construction activities in an orderly manner along the critical path.
- B. **Network.** A network diagram is a graphic representation showing the relationship of activities and events in the correct sequences required to complete the project within the Contract Time.
- C. **Activity.** An activity is any single identifiable step in the project. It depends upon and cannot begin until completion of all preceding activities.
1. Critical activities are activities with no (zero) float time and are, therefore, operations that determine the critical path and control project completion.

- D. **Event.** An event is the starting or ending point of an activity and occurs only when all preceding activities have been completed.
- E. **Float Time.** The amount of time available for a given activity in excess of its estimated duration. It represents the amount of leeway available in scheduling an activity. All float time belongs to the Owner.
 - 1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 - 2. Total float is the amount of time an activity can be delayed without adversely affecting overall time for project completion.

PART 2 - PRODUCTS

2.1 **CPM SCHEDULE**

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

PART 3 - EXECUTION

3.1 **CPM SCHEDULE**

- A. **General.** Prepare a CPM Construction Schedule using the network analysis diagram system known as the Critical Path Method (CPM) following procedures outlined in "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry," as published by The Associated General Contractors of America.
 - 1. Follow the steps necessary to complete development of the network diagram in sufficient time so that the CPM schedule can be submitted and accepted for use before the first progress payment.
 - 2. Conduct educational workshops to train and inform key project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating the CPM schedule and for reporting progress; coordinate procedures with progress meeting dates. Use "one working day" as the unit of time.
- B. **CPM Schedule Preparation.** Prepare a listing of all activities involved in the project; include every activity having a bearing on the time required to complete the work. Provide the best data available for generation of the network diagram and CPM schedule.
 - 1. Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities.
 - 2. Indicate estimated times for the following activities to be performed:
 - a. Preparation and processing of submittals.
 - b. Temporary construction services and facilities.
 - c. Purchase of materials.

- d. Delivery.
 - e. Fabrication.
 - f. Installation.
 - g. Start-ups.
 - h. Operational demonstration.
 - i. Training.
 - j. Progress meetings.
 - k. Preconstruction conference.
- C. **Processing.** Enter prepared data on the processing system. Process data to produce output data or a computer-drawn time-scaled network based on calendar days. Draw network by hand if the equipment is unable to do so. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the best possible CPM construction schedule within the limitations of Contract Time.
- D. **Format.** Display the full network on a single sheet of stable transparency, or other reproducible media, of sufficient width to show data clearly for the entire construction period.
- 1. Mark the critical path. Locate the critical path near the center of the network; locate paths with the most float near the edges.
 - 2. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. **Initial Issue.** Prepare the initial issue of the CPM Schedule network diagram from a listing of straight "early-start total-float" sort. Identify critical activities. Prepare tabulated reports to show the following:
- 1. Contractor or subcontractor and work or activity.
 - 2. Principal events of that activity.
 - 3. Early and late start dates.
 - 4. Early and late finish dates.
 - 5. Activity duration in working days.
 - 6. Total float or slack.
- F. **Submittal and Distribution.** Submit the initial issue of the network for acceptance. When authorized, distribute copies to the OWNER, principal subcontractors and suppliers or fabricators, and others identified by the Contractor with a need-to-know-schedule responsibility.
- 1. Post copies in the project meeting rooms and temporary field office.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the work and are no longer involved in performance of construction activities.
 - 3. Submit copies of each computer-produced report (listing).
- G. **Schedule Updating.** Revise the schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each project meeting.

END OF SECTION

SECTION 01 32 33

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish the construction photographs in accordance with the plans and as specified herein.

B. **This section specifies administrative** and procedural requirements for construction photographs.

1.3 QUALITY ASSURANCE

A. **Codes and Standards.** Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

B. **Associated Services.** Cooperate with the photographer's work. Provide reasonable auxiliary services as requested, including access and use of temporary facilities including temporary lighting.

1.4 SUBMITTALS

A. **General**

- 1. Submit all submittals in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- 2. The Contractor shall furnish all equipment and labor materials required to provide the Owner with digital construction videos and photographs of the project. Videos shall be recorded on a thumb drive.
- 3. Photo and video files shall become the property of the Owner, and none of the videos or photographs produced as part of this project shall be published or used without the written permission of the Owner.

B. **Pre- and Post-Construction Videos and Photographs**

- 1. Prior to beginning any work, the Contractor shall take project videos and photographs of the work area to record existing conditions.
- 2. Following completion of the work, the Contractor shall take project videos and photographs of the completed equipment and modifications, in the same way as the pre-construction areas were documented.
- 3. All conditions which might later be subject to disagreement shall be shown in sufficient photographic detail to provide a basis for decisions.

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4. The pre-construction videos and photographs shall be submitted to the OWNER within 25 calendar days after the date of receipt by the Contractor of the Notice to Proceed. Post-construction videos and photographs shall be provided prior to final acceptance of the project.

C. Progress Photographs

1. Photo files shall be provided on thumb drives.
2. Photographs shall include the date and time marking of the recording. All photographs shall be labeled on a tab connected to the bottom of the photo to indicate date and description of work shown.
3. A minimum of 10 photographs shall be submitted with each request for payment. The view shall be as agreed to with the OWNER. Prints of each photograph are not required.

D. Submittals

1. Construction photographs on thumb drives shall be submitted with each payment request.

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide all labor and materials necessary to furnish the following submittals as required by each individual section of the specifications.
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Operation and Maintenance (O&M) manuals.
 - 4. Start-up documents.
 - 5. Special warranties.
 - 6. Project record documents.
 - 7. Others (as specified in the individual technical specifications).

1.3 SUBMITTALS

A. **General**

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

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

- 1. Submit a submittal schedule according to paragraph 2.05 of Section 00 70 00 "Standard General Conditions."
 - a. This schedule shall include all submittals (including all Prime Contractors' submittals) that are required to be used on the project, and the date of submittal to the Engineer/Architect.
 - b. Include in schedule a milestone for notification of the OWNER prior to field-verifying operation and maintenance manuals.
 - c. Submittals requiring multiple submissions shall include multiple listings on the documents.
 - d. The OWNER will review the list and make any necessary comments.
 - e. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 - f. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently.
 - g. Processing. Allow sufficient review time so that installation will not be delayed as a result of the time required to process

submittals, including time for resubmittals, depending upon the complexity of the submittal.

- 1) Allow 4 weeks for processing each submittal.
- 2) No extension of the Contract Time will be authorized because of failure to transmit submittals to the OWNER sufficiently in advance of the work to permit processing.

1.4 **DELIVERY, STORAGE, AND HANDLING**

- A. **Store and protect large samples and mock-ups** until the Project is completed, then properly dispose of off-site.
- B. **Maintain and make available** to the OWNER, at the job site, a complete file of all approved submittals as part of the project record documents.

PART 2 - PRODUCTS

2.1 **SUBMITTAL TRANSMITTAL**

- A. **Transmit each submittal** from the Contractor to OWNER using a transmittal form. Include the following on the transmittal form.
 1. Relevant information and requests for data.
 2. Deviations from Contract Document requirements, including minor variations and limitations.
 3. The specification section number.
 4. Other pertinent information to identify the items being submitted.

2.2 **GENERAL REQUIREMENTS FOR SUBMITTALS**

- A. **Originals**
 1. The Contractor, the subcontractors, or suppliers shall generate submittal information.
 2. No reproductions of partial (or complete) versions of the plans, sections, details, schematics, or specification pages from the Contract Documents are acceptable.
- B. **Complete Submittals.** Clearly describe the equipment to be furnished with complete and detailed submittal information.
- C. **Identification.** Properly identify all submittal-related documents and arrange in a logical order to best present the information. Provide an index that includes the following on every submittal.
 1. Manufacturer's name and address.
 2. Submittal date and revision number, if applicable.
 3. Contract identification and specification section.
 4. Drawing scale and orientation.
 5. Submittal page number or sequence of pages.
 6. Drawing number.

D. **Verification**

1. Where existing conditions or structures exist, field-verify dimensions, elevations, clearances, and all applicable spaces.
2. The submittal shall not be accepted for review until such verified data is clearly indicated.

E. **Legends**

1. All submittal diagrams, drawings, and schematics shall include complete keys, legends or similar explanation as to the graphics, and symbols and abbreviations used.
2. In general, all graphics, symbols, abbreviations, and equipment nomenclature used for a submittal shall duplicate those used on the Contract Drawings.

F. **Approvals.** Provide the following on each submittal.

1. A space approximately 4 inches x 5 inches on to record the Contractor's review and approval markings and the action taken. These shall include the Contractor's:
 - a. Approval stamp.
 - b. Signature.
 - c. Date of approval.
 - d. Deviations from the Contract Documents.
2. An equal area beside the Contractor's review and approval markings for the OWNER's review stamp.

G. **One Section per Submittal.** Each submittal shall pertain to only one specification section.

H. **All submittal information shall be:**

1. Neatly arranged.
2. Legible.
3. Not distorted or faded.
4. English.
5. In United States standard units.
6. Typed.

I. **All letters, certifications, and similar documents** shall be submitted in their entirety. Single pages of multiple-page letters, or letters with deleted passages will not be acceptable for submittal purposes.

J. **Generic letters, test reports,** material certifications, or similar documents which do not specifically address the requirements of the Contract Documents for the actual materials being furnished will not be acceptable.

K. **Mark all submittals** to clearly indicate the full extent of the equipment to be furnished.

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1. Indicate all options to be provided, materials of construction, dimensions, and other information pertinent to the submittal.
2. Options, materials, and dimensions which do not pertain to the materials or equipment to be furnished shall be neatly marked out so as to avoid confusion and doubt during review, delivery, and installation.

L. **Resubmittals must clearly identify** all changes and revisions.

1. The drawing shall be marked "revised" with the revision date indicated.
2. Each resubmittal shall reference the previous submittal by the Engineer/Architect's log number.

M. **"By Others."**

1. All submittals are reviewed as if prepared by the Prime Contractor.
2. The term "By Others" is appropriate to indicate supply by the OWNER.
3. Where a subcontractor or supplier uses the term "By Others" to indicate work by the Prime Contractor or another subcontractor or supplier, the Prime Contractor shall change "By Others" to indicate the actual source.

N. **Deviations from Contract.** Highlight, encircle, or otherwise indicate deviations from the Contract Documents in all submittals.

2.3 SPECIFIC SUBMITTAL-TYPE REQUIREMENTS

A. **Shop Drawings.** The following paragraphs detail the general requirements for shop drawings and specific requirements for specific types of shop drawings.

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

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- 6) Similar drawings showing the incorporation of materials and equipment into the work.
- 7) The physical layout to scale, including elevations, plant grid coordinates, dimensions to new/existing structures, and other items of the work.
- 8) Dimensions.
- 9) Labeling.
- 10) Notes.
- 11) Legends.
- 12) Bills of materials.
- 13) All other information required to graphically describe the proposed work.

3. System Schematics and Diagrams.

- a. These include schematic representations of systems and equipment in a manner which shows the relative relationship of the components within the system and interconnections or interfaces with other systems or equipment.
- b. These systems shall be shown on the most appropriate type and format of schematic diagram.
- c. Diagrams shall identify all equipment and other components.
- d. Indications shall be provided of system features such as flow directions, flow ranges, component sizes, capacities, settings, interlocks, component identification, and component or subsystem function.
- e. Various types of systems for which schematic diagrams shall be required include:
 - 1) Process Piping Systems.
 - 2) Plumbing and Utility Piping Systems.
 - 3) Heating and Air Conditioning Systems.
 - 4) Ventilating Systems.
 - 5) Pneumatic Systems.
 - 6) Hydraulic Systems.
 - 7) Conveying Systems.
 - 8) Process and Chemical Feed Equipment Systems.
 - 9) Electrical Distribution Systems.
 - 10) Control Systems.
 - 11) Alarm Systems.
 - 12) Communication Systems.
- f. In some instances it may be appropriate to combine multiple types of system schematics onto a single drawing. In general, this practice would be appropriate for simple, self-contained systems and the adjacent subsystems and when required to clearly show system functionality.

B. Product Data

1. General. Product data is submittal information that fully describes the item to be incorporated into the work. Product data shall include when applicable:

- a. Manufacturer name.
- b. Catalog cut-sheets.
- c. General descriptive bulletins/brochures/specifications.
- d. Materials of construction data and parts list.
- e. Finish/treatment data.
- f. Equipment/material weight/loading data.
- g. Power/utility requirements.
- h. Engineering design data, calculations, and system analyses.
- i. Digital system documentation.
- j. Any deviations from the contract documents.
- k. Material Certifications. These include signed certificates or declarations by the Contractor, supplier, manufacturer, testing laboratory, or recognized certification agency which document that materials and product composition or construction comply with specified requirements and stated reference standards.
- l. Manufacturer's printed recommendations.
- m. Compliance with recognized trade association and testing agency standards.
- n. Application of testing agency labels and seals.
- o. Notation of dimensions verified by field measurement.
- p. Notation of coordination requirements.
- q. Specific response to detailed specification requirements.
- r. Maximum operating pressure and temperature ratings.
- s. Other information specifically called for under the sections of Divisions 1 through 44 shall be included in this category.

C. O&M Manuals

- 1. General.
 - a. Bind each copy in an appropriately sized three-ring notebook a cover designating the name of equipment, maintenance, and specification section number.
 - b. Bind operation and maintenance instructions for each specification section in a separate notebook.
- 2. Required Information. Include the following information to provide a description of the incorporation of the equipment into the work and with functional data to evaluate equipment operation.
 - a. Operation Sequence Descriptions. These shall:
 - 1) Include complete, detailed written descriptions of the operating sequence of all control systems and operations in all modes.
 - 2) Be specifically prepared for this work.
 - 3) Be fully referenced to control diagrams and system components.
 - 4) Include start-up and shut-down procedures and operations under manual, automatic, and emergency (alarm) conditions and any alternate operating modes.

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- 5) Include operation of switches, lights, timers, relays, contacts, valves, motors, and equipment components.
 - 6) Describe interlock functions including system safety functions.
- b. Software/Programming Documentation.
- 1) Reference this documentation to the Operating Sequence Descriptions and include flow charts, program source codes listings, and documentation ladder diagrams with detailed descriptions for each rung of the software provided.
 - 2) Provide information to instruct and to familiarize the operator with the system programming to enable a step-by-step evaluation of the program.
 - 3) Provide notations, remarks, and labeling on the program source code listing to indicate the program operation and function.
 - 4) Provide any additional narrative description of the program operation to fully describe the system parameters and functionality in a clear and logical manner.
- c. Manufacturer's Instructions:
- 1) Installation, routine preventive maintenance, troubleshooting, and lubrication instructions.
 - 2) Procedures for moving, supporting, and anchoring of equipment, including tolerances for settings and adjustment.
 - 3) Storage requirements to protect products prior to installation and during periods of prolonged shutdown.
 - 4) Storage requirements of extra materials.
- d. Parts List. Include assembly, exploded-view illustrations, or sectional drawings with all parts identified. Also include descriptions, quantity (per assembly) required, and original equipment manufacturer's part numbers.
- e. Supplier Data. Provide addresses, telephone numbers, and names of contact persons for equipment manufacturer and manufacturer's representative. Include both regional (local) and home offices.
- f. Warranties and Guarantees. Include copies of the approved draft warranties in the initial operation and maintenance manual submittal. Following substantial completion, provide copies of the executed final warranties for insertion into the final operation and maintenance manuals.
- g. Approved Submittals. Provide a complete list (including submittal numbers) of all approved submittals pertaining to the operation and maintenance instructions.
- h. Copies of all materials shipped with the equipment.
- i. Copies of all approved submittals including control wiring diagrams.

D. Start-Up Documents

- 1. Start-Up Request.
 - a. Start-up requests shall include the following:
 - 1) Qualifications of Manufacturer's Representative. See paragraph 2.3 E.
 - 2) Field Test Procedures.
 - a) List of materials and equipment necessary for testing.
 - b) Calibration. Certification of calibration of all test instruments used.
 - c) Test Form Report. Copy of testing results report form.
 - 3) Proposed start-up schedule including all field testing.
- 2. Manufacturer's Representative's Reports.
 - a. Each manufacturer's representative shall prepare a report on every site visit for each system or item of equipment inspected, adjusted, started up, or worked on.
 - b. If a manufacturer's representative visits the site for equipment specified in several specification sections, a separate report shall be filed for each specification section.
 - c. The report shall state:
 - 1) The purpose of the visit.
 - 2) The representative's observations and conclusions.
 - 3) Recommendations for further visits or action.
 - 4) A tabulation or log of the settings of all adjustable components.
 - a) Initial settings shall be recorded and submitted on the first visit.
 - b) During subsequent visits, the manufacturer's representative shall add the current or adjusted setting to the tabulation or log.
 - 5) Include manufacturer's certification that equipment being tested has been inspected with regard to conformance to the plans, specifications, and shop drawings and that it has been tested and is ready for operational demonstration.
 - 6) All test reports for all required field testing.

E. Special Warranties

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- 1. General. There are two general types of warranties covered by this specification.
 - a. Manufacturer's Express Warranties.
 - 1) These are formal statements of certifications by manufacturers which warrant to the Owner that products and equipment are free from defects in material and workmanship.
 - 2) These are standard warranties issued with products and equipment which supplement the Contractor's warranty and may also extend coverage past the expiration of the Contractor's warranty.
 - 3) Include with the manufacturer's warranty data shall be a notification of the availability of an extension to the standard warranty including terms.
 - b. Special Express Warranties.
 - 1) The form, format, and conditions of special warranties are described in the various specification sections of the Contract Documents.
 - 2) These are formal warranties above and beyond the Contractor's warranty and manufacturer's standard warranties.
 - 3) These warranties may be based on performance, power consumption, maintenance projects, or other operating parameters.
 - 4) Extended warranties, service contracts, and performance bonds are also included under this category.
- 2. Term or Period.
 - a. General. Unless otherwise established by individual sections in Divisions 2 through 44, all Contractor express warranties shall extend for 1 calendar year from the date of substantial completion of the project or acceptance date of the product or portion of work thereof, whichever is the later date.
- 3. Content of Warranty.
 - a. General. The warranty shall contain, as applicable:
 - 1) Effective starting date of the warranty period.
 - 2) Statement of the terms and conditions of the warranty, if any.

F. Project Record Documents

- 1. General. Project record documents are to be in accordance with Paragraph 6.12 of Section 00 70 00 "Standard General Conditions."
- 2. Record Contract Drawings. Legibly mark contract drawings to record actual construction including:

- a. Depths of various elements of foundation in relation to data.
- b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
- c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
- d. Field changes of dimension and detail.
- e. Changes made by change order or field order.

G. Extra Materials / Spare Parts

- 1. General. Coat or package extra materials to prevent corrosion or deterioration during long-term indoor storage.
- 2. Clearly label all packaging with:
 - a. Part name.
 - b. Part number.
 - c. Associated equipment name and number.
 - d. Manufacturer's name and address.
 - e. The required storage environment for the materials.

- H. **Other.** These include special tools/repair parts list, photographs, videos, certificates, construction schedules, drawings, reports, meeting minutes, data, and information required by the Contract Documents which do not logically fall into the submittal types defined above.

PART 3 - EXECUTION

3.1 SUBMITTAL PREPARATION AND TRANSMITTAL

A. Coordination

- 1. Coordinate preparation and processing of submittals with performance of construction activities.
- 2. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay and in accordance with the submittal schedule.

B. Verification

- 1. Verify the correctness and completeness of all submittals prior to forwarding same for review.
- 2. All submittals shall comply with the Contract Documents.

- C. **Package each submittal** appropriately for transmittal and handling including a transmittal form.

- D. **The Prime General Contractor shall submit** the minimum number of submittals as listed in Paragraph 3.3 of this specification.

- E. **Submittals received from sources** other than the Prime General Contractor will be returned without action.

3.2 OWNER'S REVIEW AND ACTION

A. General

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

B. Action Stamp. The OWNER will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate action taken.

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

3.3 MINIMUM NUMBER OF SUBMITTALS AND DISTRIBUTION

A. After a submittal (electronic copy) has been approved, the electronic copy distribution shall be as follows:

| Submittal | Minimum No. of Submittals | Distribution | |
|-----------------------------|---------------------------|--------------|------------|
| | | Owner | Contractor |
| 1. Shop Drawings | 1 | 1 | 1 |
| 2. Product Data | 1 | 1 | 1 |
| 3. Samples/Mock-Ups | 1 | 1 | 0 |
| 4. O&M Manuals | 4* | 4* | 1 |
| 5. Personnel Qualifications | 1 | 1 | 1 |
| 6. Training Documents | 1 | 1 | 1 |

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| | | | |
|---|---|---|---|
| 7. Source Quality Control Documents | 1 | 1 | 1 |
| 8. Material Field Test Reports | 1 | 1 | 1 |
| 9. Start-Up Documents | 1 | 1 | 1 |
| 10. Operational Demonstration Documents | 1 | 1 | 1 |
| 11. Special Warranties | 1 | 1 | 1 |
| 12. Project Record Documents | 1 | 1 | 0 |
| 13. Extra Materials | 1 | 1 | 0 |
| 14. Others | 1 | 1 | 1 |

*—The Contractor shall provide the Owner with two hardcopies of each O&M Manuals and two electronic copies of all combined O&M Manuals in PDFs on USB drive.

B. Multiprime Contract Distribution.

- 1. The OWNER will forward all reviewed submittals to the Prime General Contractor only.

3.4 SPECIFIC SUBMITTAL-TYPE EXECUTION REQUIREMENTS

A. O&M Manuals

- 1. Submittal Procedure. Submit one initial copy of the O&M manual electronically for review. After approval of the initial copy, submit the remainder of the revised manuals.
- 2. Verification. Verify the accuracy of the initial O&M manual by visual and physical inspection of the installed equipment during start-up.
 - a. Perform field verification in the presence of the OWNER or OWNER's Representative.
 - b. Physically trace and document as required all wiring and piping.
 - c. Visually inspect equipment and components and compare configurations and nameplate information to O&M manual.
 - d. Make any changes, additions, or deletions to the O&M manual identified during field verification.
 - e. In the event changes are made to the equipment following field verification, submit a final supplement of the revisions of the O&M manuals before approval.

END OF SECTION

SECTION 01 50 00

TEMPORARY CONSTRUCTION SERVICES AND FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of each Prime Contract, including General and Supplementary Conditions and other Division 1 specification sections, apply to this section.

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and material necessary to furnish, install, and maintain the temporary construction services and facilities in accordance with these plans and as specified herein. Temporary construction services and facilities include the following.

- 1. Temporary utilities required include, but are not limited to:
 - a. Water service and distribution.
 - b. Temporary electric power and light.
 - c. Telephone service.
 - d. Storm and sanitary sewer.
- 2. Temporary construction and support facilities required include, but are not limited to:
 - a. Hoists and temporary elevator use.
 - b. Temporary heat.
 - c. Field offices and storage sheds.
 - d. Temporary roads and paving.
 - e. Sanitary facilities, including drinking water.
 - f. Temporary enclosures.
 - g. Temporary bulletin boards.
 - h. Waste disposal services.
 - i. Construction aids and miscellaneous services and facilities.
 - j. Dewatering facilities and drains.
 - k. Rodent and pest control.
- 3. Security and protection facilities required include, but are not limited to:
 - a. Environmental protection.

1.3 QUALITY ASSURANCE

- A. **Regulations.** Comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Building code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Police, fire department, and rescue squad rules.
5. Environmental protection regulations.

B. **Standards.** Comply with National Fire Protection Association (NFPA) Code 241, "Building Construction and Demolition Operations"; American National Standards Institute (ANSI) A10 Series standards for "Safety Requirements for Construction and Demolition"; and National Electrical Contractors Association (NECA) Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services" prepared jointly by Associate General Contractors of America (AGC) and Adhesive and Sealant Council, Inc. (ASC) for industry recommendations.
2. Electrical Service. Comply with National Electrical Manufacturers Association (NEMA), National Electrical Contractors Association (NECA), and Underwriters' Laboratories, Inc. (UL) standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NEC) (NFPA 70).

C. **Inspections.** Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits and keep on file for Owner review.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

A. Conditions of Use

1. Keep temporary services and facilities clean and neat in appearance.
2. Operate in a safe and efficient manner.
3. Take necessary fire-prevention measures.
4. Do not overload facilities.
5. Do not allow hazardous, nuisance, or unsanitary conditions to develop or persist on the site.
6. Do not permit facilities to interfere with progress.
7. The installer of each permanent service or facility shall assume responsibility for its operation, maintenance, and protection during its use as a construction service or facility prior to the Owner's acceptance, regardless of previously assigned responsibilities.
8. At the earliest feasible time, when acceptable to Owner, change over from use of the temporary service to use of the permanent service.

1.6 **DIVISION OF RESPONSIBILITIES**

A. General

1. The General Contractor is responsible for providing temporary services and facilities for:
 - a. Installation, operation, maintenance, and removal of each temporary service or facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each such service or facility.
 - b. Plug-in electric power cords and extension cords, and supplementary plug-in task lighting and special lighting necessary exclusively for its own activities.
 - c. Its own field office, complete with necessary furniture, utilities, and telephone service.
 - d. Its own storage and fabrication sheds.
 - e. Temporary heat, ventilation, humidity control, and enclosure of the building where these utilities are necessary for its construction activity, but where these utilities have not yet been installed by the responsible Prime Contractor.
 - f. Special or unusual hoisting requirements, including hoisting loads in excess of 2 tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside the building enclosure.
 - g. Collection and disposal of its own hazardous, dangerous, unsanitary, or other harmful waste material.
 - h. Secure lockup of its own tools, materials and equipment.
 - i. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

B. The Contractor is responsible for:

1. Temporary telephone service.
2. Temporary roads and paving.
3. Temporary toilets, including disposable supplies.
4. Temporary wash facilities, including disposable supplies.
5. Containerized bottled water type drinking water units.
6. Temporary enclosure of the building.
7. General collection and disposal of wastes.
8. Enclosure fence.
9. Security enclosure and lockup.
10. Environmental protection.
11. Temporary electric power service and distribution.
12. Temporary lighting.
13. Connections for illuminated signs.

1.7 USE CHARGES

- A. **General.** Cost or use charges for temporary facilities are not chargeable to the Owner; Contractor's cost or use charges for temporary services or facilities will not be accepted as a basis of claim for an adjustment in the Contract Sum or Contract Time.
- B. **Water Service.** Water from the Owner's existing water system, if available, shall be used without metering and without payment of use charges.
- C. **The costs of providing and using temporary services** and facilities, including use charges, are paid by the Contractor and shall be totally included in the Contract Sums.
- D. **Other entities using temporary services** and facilities include, but are not limited to:
 - 1. The Owner's work forces.
 - 2. Occupants of the project.
 - 3. Testing agencies.
 - 4. Personnel of government agencies.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **General.** Provide new or acceptable previously used materials. Provide materials suitable for the use intended.
- B. **Open Mesh Fencing.** Provide 11 gauge, galvanized 2 inch, chain-link fabric fencing 6 feet high with galvanized barbed wire top strand and galvanized steel pipe posts, 1-1/2 inch inside diameter (I.D.) for line posts, and 2-1/2 inch I.D. for corner posts.

2.2 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. **Use qualified personnel** for installation of temporary facilities.

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

3.2 **TEMPORARY UTILITY INSTALLATION**

- A. **General.** Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
 - 1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.
 - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 - 3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.
- B. **Water Service.** Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use. Disinfect temporary water piping prior to use.
- C. **Temporary Electric Power Service**
 - 1. Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction.
 - 2. Include meters, transformers, overload protected disconnects, automatic ground fault interrupters, and main distribution switch gear.
 - 3. Power Distribution System. Install wiring overhead, and raise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 Vac 20 ampere rating and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.
- D. **Temporary Lighting.** Whenever an overhead floor or roof deck has been installed, install temporary lighting with local switching.
 - 1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire lighting system, and will provide adequate illumination for construction operations and traffic conditions.

- E. **Temporary Telephones.** Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and first aid station.
 - 1. At each telephone, post a list of important telephone numbers.

- F. **Sewers and Drainage.**
 - 1. If sewers are available, provide temporary connections to remove influent that can be discharged lawfully.
 - 2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities.
 - 3. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.
 - 4. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
 - 5. Connect temporary sewers to the municipal system as directed by the sewer department officials.
 - 6. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.

- G. **Provide earthen embankments and similar barriers** in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 **TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES
INSTALLATION**

- A. **Temporary Heat**
 - 1. Provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity.
 - 2. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
 - 3. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 - 4. Provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
 - 5. Do not use gasoline-burning space heaters, or open-burning or salamander-type heating units.

- B. **Field Offices.** Provide an insulated, weathertight, heated, or air-conditioned temporary office of sufficient size to accommodate required office personnel at the project site.
 - 1. The General Contractor shall provide, either as a part of its field office or as a separate facility, a room of not less than 240 square feet (sf) for

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project meetings. Furnish the room with a conference table, eight folding chairs, and a tackboard. Keep the office clean and orderly.

- C. **Storage and Fabrication Sheds.** Install storage and fabrication sheds, sized, furnished, and equipped to accommodate materials and equipment including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.
- D. **Sanitary facilities include** temporary toilets, wash facilities, and drinking water fixtures.
1. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities.
 2. Install where facilities will best serve the project's needs.
 3. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
 4. Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
 5. Provide bottled-water-type drinking water units.
 6. Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- E. **Temporary Enclosures.** Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 2. Install tarpaulins securely, with fire-treated wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
 3. Close openings through floor or roof decks and horizontal surfaces with load bearing wood framed construction.
- F. **Project Identification and Temporary Signs**
1. Temporary Signs. Prepare signs to provide directional information to construction personnel and visitors.
 2. Support on posts or framing of preservative-treated wood or steel.
 3. Do not permit installation of unauthorized signs.

- G. **Temporary Site Lighting.** Install exterior yard and sign lights so that signs are visible when work is being performed.
- H. **Collection and Disposal of Waste.** See Section 01 74 23 "Cleaning."
- I. **Stairs**
 - 1. Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
 - 2. Cover finished permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.
- J. **Rodent and Pest Control**
 - 1. Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests.
 - 2. Employ this service to perform extermination and control procedures at regular intervals so the project will be relatively free of pests and their residues at Substantial Completion.
 - 3. Perform control operations in a lawful manner using environmentally safe materials.

3.4 **SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. **General.** Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested.
- B. **Temporary Fire Protection**
 - 1. Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.
 - 2. Comply with NFPA 10, "Standard for Portable Fire Extinguishers," and NFPA 241, "Standard for Safeguarding Construction, Alterations and Demolition Operations."
 - 3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - 4. Store combustible materials in containers in fire safe locations.
 - 5. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
 - 6. Prohibit smoking in hazardous fire exposure areas.
 - 7. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. **Permanent Fire Protection.** At the earliest feasible date in each area of the project, complete installation of the permanent fire protection facility, including

connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs, and Lights

1. Comply with standards and code requirements for erection of structurally adequate barricades.
2. Paint with appropriate colors, graphics, and warning signs to warn personnel and the public of the hazard.
3. Where needed, provide lighting including flashing lights.

E. Enclosure Fence

1. When excavation begins, install an enclosure fence with lockable entrance gates.
2. Locate where indicated, or enclose the portion determined sufficient to accommodate construction operations.
3. Install in a manner that will prevent people and animals from easily entering the site, except by the entrance gates.
4. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.

F. Security Enclosure and Lockup

1. Install substantial temporary enclosure of partially completed areas of construction.
2. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
3. Storage of Valuable Material. Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

G. Environmental Protection

1. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result.
2. Avoid use of tools and equipment which produce harmful noise.
3. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

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

B. Maintenance

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

C. Termination and Removal

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

END OF SECTION

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Transport and handle materials and equipment in accordance with the manufacturer's recommendations and requirements of Contract Documents. Make all arrangements for transportation, delivery, storage, and handling of equipment and materials required for prosecution and completion of the work.

1.3 QUALITY ASSURANCE

Not used.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. **Delivery.** Deliver shipments of materials and equipment to the site only during regular working hours. Shipments shall be addressed and consigned to the proper party giving name of Contract, street number, and County. Shipments shall not be delivered to the Owner or Owner's Representative, except as otherwise directed. Transportation shall be in accordance with Part 3 of this section.
- B. **Storage and Handling**
 - 1. Store, handle, and protect materials in accordance with the manufacturer's recommendations and the requirements of Part 3 of this section.
 - 2. Maintain equipment in an undeteriorated and fully serviceable condition and as specified in Part 3 of this section.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 **TRANSPORTATION**

A. **General.** Arrange deliveries of products in accordance with the construction schedule and in ample time to facilitate inspection prior to installation.

B. **Coordination**

1. Coordinate deliveries to avoid conflict with work and conditions at site and to accommodate the following:

- a. Work of other contractors.
- b. Limitations of storage space.
- c. Availability of equipment and personnel for handling products.
- d. Owner's use of premises.

2. Do not have products delivered to project site until related shop drawings have been approved.

3. Do not have products delivered to site until required storage facilities have been provided.

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

C. **Inspection**

1. Immediately upon delivery, inspect shipment to ensure that:

- a. Product complies with requirements of Contract Documents and reviewed submittals.
- b. Quantities are correct.
- c. Containers and packages are intact and labels are legible.
- d. Products are properly protected and undamaged.

3.2 **HANDLING**

A. **Methods**

1. Provide equipment and personnel necessary to handle products without soiling or damaging products or packaging.

2. Lift heavy components only at designated lifting points.

3. Handle materials and equipment at all times in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them.
4. Do not drop, roll, or skid products off delivery vehicles. Hand carry or use suitable materials handling equipment.
5. Keep interiors completely free of dirt and foreign matter.

3.3 STORAGE AND PROTECTION

A. General

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

B. Storage Areas

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

C. Storage Methods

1. Do not open manufacturer's containers until the time of installation unless recommended by the manufacturer or otherwise specified.
2. Do not store products in the structures being constructed unless approved in writing.
3. The following types of materials may be stored out-of-doors and on wood blocking so there is no contact with the ground.
 - a. Masonry units.
 - b. Reinforcing steel.
 - c. Structural steel.
 - d. Piping.
 - e. Precast concrete items.
 - f. Castings.
 - g. Handrailing.

4. The following types of materials may be stored out-of-doors if covered with material impervious to water and sunlight. Store materials on wood blocking and tie down covers with rope and slope to prevent accumulation of water on covers.
 - a. Construction lumber.
 - b. Wood for formwork.
 - c. Fiberglass and plastic materials which are not ultraviolet (UV) protected.
5. Store all products not listed above in buildings or trailers which have a concrete or wooden floor, a roof, and fully closed walls on all sides.
6. Provide heated storage space for materials that would be damaged by freezing.
7. Protect mechanical and electrical equipment from contamination by dust, dirt, and moisture.
8. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

D. Inspection

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

3.4 MAINTENANCE

A. Maintenance Log. Prepare a maintenance log for all equipment.

1. This log shall include a list of required maintenance services and inspections, as provided by the manufacturer.
2. The log shall include checklists for the periodic services and inspections required.
3. Initial and date the checklist upon completion of the individual servicing or inspection.
4. Locate the maintenance log in the field office and have it available for review until it is submitted for record purposes upon completion of the work and the start of the warranty period.

B. Preparation

1. Before removing an item from storage, review the installation location. Protection and services at the installed location must meet the equipment storage requirements.
2. Before moving equipment to the installed location, have materials available for temporary shelter or services required to establish the proper storage environment.

C. Performance of Maintenance

1. Perform all storage and preventive maintenance and inspections required by the manufacturer at the specified intervals from the time of delivery until completion of the work.
2. When notified by the Owner or Owner's Representative of a maintenance deficiency, perform corrective maintenance. Corrective maintenance will be performed per the manufacturer.
3. Reestablish storage maintenance in the event an item or equipment is removed from service.

END OF SECTION

SECTION 01 74 23

CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Throughout the construction period, maintain all areas of new and existing buildings and site constructed or affected by the work of the Contract in a standard of cleanliness as described in this section.
- B. **Related Work Described Elsewhere.** In addition to standards described in this section, comply with all requirements for cleaning up as described in various other sections of these specifications.

1.3 QUALITY ASSURANCE

- A. **Inspection.** Conduct daily inspections, and more often if necessary, to verify that requirements of cleanliness are being met.
- B. **Codes and Standards.** In addition to the standards described in this section, comply with all pertinent requirements of governmental agencies having jurisdiction and comply with Occupational Safety and Health Administration (OSHA) Housekeeping Standards, Subpart C, Section 1926.25.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

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

2.2 COMPATIBILITY

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. General

1. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.
2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of the work.
3. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Comply with OSHA Section 1926-252 of Subpart H of Part 1926, Disposal of Waste Materials.
5. Provide adequate storage for all items awaiting removal from job site, observing all requirements for fire and environment protection.
6. Do not bury waste materials within the project site.

B. Site

1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material.
2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site; restack, tidy, or otherwise service all arrangements to meet the requirements of Paragraph 3.1 A of this section.
3. Maintain the site in a neat and orderly condition at all times and comply with OSHA Housekeeping Standards, Subpart C, Section 1926.25.

C. Structures

1. Weekly, and more often if necessary, inspect the structures, pick up all scrap, debris, and waste material.
2. Weekly, and more often if necessary, sweep all interior spaces clean. Interpret "Clean" (for the purpose of this subparagraph) as meaning free from dust and other material capable of being removed by use of reasonable effort and hand-held broom, except that vacuum cleaning shall also be employed if dust accumulates on surfaces above floor.

3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
4. Following the installation of finish floor materials, clean finish floor daily (and more often if necessary) while work is being performed in the space. Interpret "clean" (for the purpose of this subparagraph) as meaning free from all foreign material which may be damaging to the finish floor material.

3.2 FINAL CLEANING

- A. **Definition.** Except as otherwise specifically provided, interpret "clean" (for the purpose of this paragraph) as meaning the level of cleanliness generally provided by skilled cleaners using commercial-quality building maintenance materials.
- B. **General.** Prior to completion of the work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final cleaning as described in paragraph 3.1 of this section.
- C. **Site.** Unless otherwise directed, broom-clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all debris.
- D. **Structures**
 1. Exterior.
 - a. Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. If necessary to achieve a uniform degree of exterior cleanliness, hose and brush down the exterior of the structure.
 - d. In the event of stubborn stains not removable with water, lightly sandblast to remove the stain.
 2. Interior.
 - a. Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter.
 - b. Remove all traces of splashed materials from adjacent surfaces.
 - c. Remove all paint droppings, spots, stains, and dirt from finished surfaces.
 - d. Sweep, vacuum, and hand-dust all areas, including concealed surfaces and overhead spaces, to remove all dust.
 3. Glass. Clean all glass inside and outside.
 4. Polished surfaces. To all surfaces requiring the routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

END OF SECTION

SECTION 01 79 00

START-UP, DEMONSTRATION, AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** This section includes general requirements for start-up, training, and operational demonstration as required by the specifications.

1.3 QUALITY ASSURANCE

- A. **Test Instruments.** Provide all instruments required for testing. Calibrate all test instruments to within appropriate test standards as established by American Society for Testing and Materials (ASTM) or the governing technical standard. Retain calibration data at the Contractor's site office for Owner or Owner's Representative's review.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

1.8 DEFINITIONS

- A. **Operational Demonstration.** An activity performed by the Contractor wherein the Owner operates and the Contractor maintains a fully functional component, system, or unit process for a minimum period of 7 continuous calendar days after start-up has been completed and stable operation has been achieved. Specifically for this project, the headworks screens, clarifier equipment, and sludge holding tank aeration blower will function continuously for 7 days prior to acceptance of the facilities.

- B. **Field Testing.** Testing performed on-site by the Contractor to satisfy requirements of the manufacturer and Contract Documents.
1. **Dry Testing.** Dry testing is performed by the Contractor without introducing either process material or other test material into the component, system, or unit process. Under certain circumstances, dry testing may consist of functional testing using potable water.
 2. **Wet Testing.** Wet testing is performed by the Contractor utilizing test material in the component, system, or unit process. Process tankage shall be filled with test material to operating level.
 3. **Performance Testing.** Performance testing is performed by the Contractor to demonstrate system performance in accordance with specification requirements.
- C. **Start-Up.** An activity performed by the manufacturer's representative with the Contractor immediately after equipment or system is completed to verify the installation.
1. Check the installation for conformance with the plans and specifications.
 2. Check the installation for conformance with the shop drawings and manufacturer's data.
 3. Verify quantities and data with the operation and maintenance (O&M) manuals.
 4. Verify that equipment is ready for operation.
 5. Place component, system, or unit process on-line.
 6. Perform all required field testing.
 7. Prepare and submit a manufacturer's representative's report including certification, recommendations, and conclusions.
- D. **Training.** To educate Owner's personnel to become qualified and proficient in the operation, maintenance, and repair of the complete system. Training shall include:
1. Classroom instruction.
 2. In-plant, on-site demonstration.
 3. Equipment demonstration.
 4. Actual hands-on operation by the Owner's staff.
- E. **Adjusting.** To install or change setting, parameters, calibrations, flows, and processes so that the equipment or system operates in a logical or more efficient state.
- F. **Balancing.** To make equipment or subsystems operate in harmony or equilibrium by adjusting, altering, or modifying parts of the system.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION**3.1 START-UP EXECUTION****A. Start-Up Preparation**

1. Prior to beginning a start-up, inspect the systems and equipment to verify their readiness to begin with the manufacturer's representative
2. Correct hazardous conditions to equipment or personnel prior to start-up of equipment.
3. Do not proceed with start-up operations using temporary power or temporary instrumentation and control wiring unless approved. All electrical and control connections shall be permanent and complete, and all such electrical components and equipment fully functional.
4. Design, fabricate, and install all necessary testing and monitoring equipment before commencing the test.
 - a. Quality. Use materials and equipment of good quality and suitable for the intended service. The use of miscellaneous items found at the job site is not acceptable.
 - b. Maximum Gauge Readings. Select capacity or range of test equipment to provide meaningful test results. Select pressure or differential pressure gauges so that test pressure is 50 percent to 75 percent of maximum gauge reading.
 - c. Temporary Equipment. Fabricate, as necessary, any temporary equipment used in testing. This equipment shall remain the property of the Contractor who will remove it from the site upon substantial completion.
5. Manufacturer's representatives shall be present for the initial start-up of all systems or equipment.
6. Request permission to start up equipment, including electrical gear, and notify the OWNER of the start-up.
 - a. Submit the start-up request a minimum of 72 hours before the scheduled start-up. Make requests in writing during normal working hours.
 - b. Start-up request shall be in accordance with Section 01 33 00 "Submittals."
 - c. The OWNER shall have the right to reject the use of an individual for facility start-up.
 - d. Approval of the request is based solely on impact on plant operations. Approval does not relieve the Contractor of any responsibility for plant and personnel safety.
 - e. Coordinate the start-up of each piece of equipment with the OWNER so that operation does not interfere with the normal operation of the facility.
7. Normal installation checks, such as for rotation, are not considered start-ups and do not require start-up notification. Clearly mark all electrical apparatus which is energized.

B. Conduct of Start-Up

1. Equipment Adjustments. Make all adjustments, corrections, and calibrations to set points, process parameters, etc., necessary to achieve normal, stable operation of systems.
2. Equipment Failure. Consider any failures of equipment or systems as deficiencies and correct them. Stop testing and the start-up until all deficiencies have been corrected.
3. System Failure.
 - a. When there appears to be a system failure and the system is composed of separate but functionally codependent individual pieces of equipment and check-out of each piece of equipment by its respective manufacturer's representative verifies that the equipment is functioning properly, then the Contractor's remains responsible for overall system operation.
 - b. Verify compatibility of equipment during the submittal process to minimize overall system operating problems.
 - c. Reconfigure, repair, modify, or replace parts or all the equipment in order to provide a system that shall perform as specified at no additional cost to the Owner.
4. Dry Testing.
 - a. Test, adjust, align, lubricate, and balance all equipment and systems in accordance with the manufacturer's instructions prior to testing.
 - b. Test individual components prior to testing the system of which they are a part.
5. Wet Testing.
 - a. After dry testing, wet test all equipment and systems for a minimum of 72 hours under the design operating conditions utilizing a test material similar to or same as the process material.
 - b. All costs, including materials and equipment, for delivery of the test material shall be at the Contractor's expense. Test each component or item of equipment to demonstrate compliance with the design criteria and operating range specified.
 - c. Suspend or secure all tests in the event that test failures or hazardous conditions occur. Make repairs, replacements, or adjustments and restart test in its entirety.
 - d. Dispose of the test material at no additional cost to the Owner.
 - e. Clean all equipment systems and structures upon conclusion of testing at no additional cost to the Owner.
 - f. Comply with any performance testing requirements specified.

6. Retesting. Repeat tests if results fail to meet test criteria, whether the failure is identified during field testing or through reviewing the test report later.
7. Performance Testing. Verify operating ranges, capacities, low and high limits, efficiencies, temperatures, speeds, pressures, sequences, etc., of each piece of equipment being tested. Check monitors, indicators, alarms, and fail-safe devices.
8. Do not use repair parts during start-up operations unless approved.
9. Furnish all lubrication and operating fluids per the manufacturer's instructions.
10. Field-verify initial copy of O&M manual according to Section 01 33 00 "Submittals."

C. Start-Up Conclusion

1. Submit manufacturer's representative's report within 48 hours of conclusion of each start-up. Report shall be in accordance with Section 01 33 00 "Submittals."

3.2 OPERATIONAL DEMONSTRATION EXECUTION

A. Operational Demonstration Preparation. Prior to the operational demonstration beginning:

1. Complete start-up procedures including submitting all reports for all parts of the work designated for the operational demonstration.
2. Complete all required construction activities, including any activities by any entity that would interrupt the normal operations of the demonstration.
3. Ensure that adequate parts and supplies for routine maintenance and replacement are on hand to support system operation through the demonstration period.
4. Deliver all repair parts to the Owner.
5. Submit an operational demonstration request according to Section 01 33 00 "Submittals," 48 hours prior to start of operational demonstration.

B. Conduct of Operational Demonstration

1. During the operational demonstration and at other times, the work will be on-line and an integral part of the plant operations and process. The Owner maintains control of plant operations and processes at all times. Therefore:
 - a. Do not commence, resume, modify, terminate, or suspend the operations without the permission of the Owner and only in a sequence and manner suitable to the Owner except in the case of an emergency.
 - b. The operation of the work shall be in strict accordance with the operational orders of the Owner.
 - c. Adjust or repair immediately, on a 24-hour-per-day, 7-day-per-week basis, any malfunction in the work which in the opinion of

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the Owner jeopardizes or may jeopardize the proper operation of the total facility.

2. Perform operational demonstrations of the entire work. With approval, individual systems may be independently demonstrated as long as their complete range of operation and performance can be shown without the rest of the facility.
3. Update. Keep the log on-site during the operational demonstration and updated on a regular basis. The log shall be available for review by the Owner or Owner's Representative at all times during the operational demonstration.
4. Maintenance. Perform all required maintenance and servicing during the operational demonstration at the specified intervals and as necessary. Note all maintenance and servicing in the operational demonstration log.
5. Time.
 - a. The operational demonstration shall last for a period of 7 consecutive days.
 - b. All equipment and systems shall remain totally operational during this period.
 - c. Upon successful completion of the operational demonstration, the work is considered to be ready for its intended use, and the Contractor may make recommendation for substantial completion.
 - d. Outages.
 - 1) Note all outages of equipment, systems, or the plant in the operational demonstration log.
 - 2) Plant power outages such as power failure, process failure of existing equipment, and planned outages of existing systems for cleaning, maintenance, or repair are considered a part of normal plant operation and will not invalidate the operational demonstration.
 - 3) Be responsible for the safe and orderly shutdown and restart of equipment as necessary in the event of an outage.
 - 4) Do not include outage time in the demonstration time period.
 - e. Do not count activities such as filling, draining, purging, heating or cooling to temperature, stabilizing, adjusting, testing, or other start-up activity time as operational demonstration time.
 - f. Failed Operational Demonstration.
 - 1) If, during the operational demonstration, any part of the work fails to fully conform to the requirements of the Contract Documents, consider the operational demonstration to have failed, and the work not to be substantially complete.

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- 2) Upon failure of the operational demonstration, promptly remedy any defects in the work and promptly reschedule and restart the complete operational demonstration time period. No operational demonstration time will be considered to have accrued to any part of the work by reason of a failed operational demonstration.
- g. Suspension of Operational Demonstration.
- 1) During the operational demonstration, the Owner may require or permit the operational demonstration to be suspended upon the written request of the Contractor to correct or adjust the work, when in the judgement of the Owner or Owner's Representative such required correction or adjustment is insufficient to deem the operational demonstration to have failed.
 - 2) If an operational demonstration is suspended for any reason except failure, operational demonstration time shall accrue to the work from the time of the beginning of the operational demonstration to the time of the suspension. No operational demonstration time shall accrue during the period of suspension.
 - 3) If an operational demonstration is suspended at the request of the Contractor, continue operation and maintenance of the work without additional charges to the Owner, according to all provisions of this section of the specifications, and to the extent required by the Owner.
6. O&M Manuals. Start-up and operation of the system and all associated equipment shall be in accordance with the O&M manuals. If deviations from the manuals are necessary, note these in the operational demonstration log, and subsequently submit as revisions to the O&M manuals.
7. Personnel and Consumables.
- a. Have sufficient personnel available during the entire demonstration to ensure proper maintenance, adjusting, troubleshooting, and any and all repairs to equipment, controls, etc., to maintain and keep the entire facility operating continuously for 7 consecutive days (720 hours).
 - b. The Owner will remain in control of the facility processes and provide the manpower to operate the facility.
 - c. The Owner will furnish all consumable supplies and power required for the 30 day complete facility operational demonstration.
 - d. Contractor's Supervision. When Owner personnel are operating systems or equipment under supervision of the Contractor during operational demonstration, make available, at all times, persons knowledgeable about the systems or equipment to direct the Owner personnel in its operation.

8. To the extent possible, operate all equipment or individual components throughout their range during this period.

C. Operational Demonstration Completion

1. Within 2 weeks of the termination or completion of the operational demonstration, submit for approval:
 - a. Any changes to O&M Instructions.
 - b. The completed operational demonstration logs according to Section 01 33 00 "Submittals."
2. The Owner will not assume full responsibility for operation and maintenance of the system and equipment until successful completion of the operational demonstration and all conditions for substantial completion have been satisfied and both the Contractor and Owner have accepted the Certificate of Substantial Completion.

3.3 TRAINING EXECUTION

- A. Training Preparation.** Coordinate and verify to ensure that, prior to the scheduled training times:
1. The equipment is ready for operation and has completed its start-up.
 2. That all associated construction required to operate the equipment in all normal and anticipated operating modes is complete.
 3. That the equipment area is safe, well lit, and unobstructed, so that all training class attendees may access, hear, view, and participate in the training.
 4. That the equipment area is free of construction activities that could present a hazard to training class participants.
 5. That adequate training materials, as required, are on hand for use during the training session.
 6. Any representatives of interfacing Prime Contractors, subcontractors or equipment suppliers needed to perform supporting operations allowing demonstration of equipment operation, have been notified and will be available.
 7. Schedule training sessions through Owner and the Engineer/Architect. Cooperate with the Owner in scheduling all required training sessions.
 8. Verify that the training materials are compatible with this equipment. Provide other audio/visual equipment and training aids as needed.
 9. The approved O&M manuals shall be available and frequent reference shall be made to the equipment O&M manuals.
 10. The instructor's qualifications, the training schedule, the lesson plan, and any instructional materials have been submitted and approved before training begins. Submittals shall be in accordance with Section 01 33 00 "Submittals."
 11. Training schedules should be submitted far enough in advance that the Owner can adjust work schedules so that all participants are available for the training sessions.

B. Conduct of Training

1. Provide at least one copy of instructional materials used for training at the time of the first training session for each attendee.
2. Before the training is complete, have all training session attendees sign an attendance sheet.
3. Discuss all items of the approved lesson plan in the classroom or the field, in complete and sufficient detail to allow the Owner's operating personnel to knowledgeably operate and maintain the equipment in accordance with manufacturer's recommended procedures and safety considerations during all anticipated operational and maintenance situations.
4. Address safety concerns and features intended to enhance safety.
5. Address tasks required to maintain the warranty.
6. The Owner reserves the right to record the training session for the future use in training employees.
7. Address all questions and comments as they are raised by the training session participants to the maximum extent practicable. If questions or comments cannot be addressed during the training session, additional materials and/or training may be required.
8. O&M material and instructional material shall not conflict.

C. Training Conclusion. Within 2 weeks of the training being completed:

1. Correct, revise, and update the O&M manuals as necessary to agree with training.
2. Submit completed sign-in sheet in accordance with Section 01 33 00 "Submittals."

END OF SECTION

SECTION 01 89 19

LEAKAGE TEST

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK.** Provide the labor, tools, equipment, and materials necessary to perform the leakage tests of pipes, equipment, and tanks in accordance with the drawings and the specifications.
- 1.3 **QUALITY ASSURANCE.** Materials and workmanship shall be in accordance with the following standards as referenced herein:
 - A. **AWWA.** American Water Works Association.
 - B. **ASTM.** American Society for Testing and Materials.
 - C. **ACI.** American Concrete Institute.
- 1.4 **SUBMITTALS** (Not used)
- 1.5 **JOB CONDITIONS.** (Not used)
- 1.6 **DELIVERY, STORAGE, AND HANDLING** (Not used)
- 1.7 **SPECIAL WARRANTY** (Not used)

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

- 3.1 **EXAMINATION.** Examine conditions under which the pipe section, facility, or part of a facility is to be tested and verify that conditions are satisfactory and ready for the test to proceed.
- 3.2 **PREPARATION**
 - A. **Protection.** Protect adjacent equipment, materials, piping, and valving against drainage from testing and/or disinfection.
 - B. **Notification.** Notify the OWNER at least 24 hours prior to any testing. Notify the OWNER immediately of all unsatisfactory or nonconforming conditions.
 - C. **Responsibility.** Beginning the test means acceptance of all the existing surfaces and conditions.

3.3 **PRESSURE MAIN AND PROCESS PIPING LEAKAGE TESTING**

- A. **Description.** Provide the leakage tests as directed and as specified herein. Furnish gauges for the tests with the most recent gauge calibration test report available for review on-site.

- B. **Leakage Allowances** (unless noted otherwise)
 - 1. Pressure Mains. The maximum leakage allowance for all pressure mains shall be 10.49 gallons per inch diameter per mile of pipe per 24 hours.
 - 2. Maximum Leakage Allowance for the 1,000 feet of existing 16 inch force main is 32 gallons per 24 hours.

- C. **Test Procedure**
 - 1. Slowly fill each pressure main or process piping section with water to the specified test pressure in a satisfactory manner.
 - 2. Before applying the specified test pressure, expel all air from the pipe.
 - 3. Maintain the test water pressure for at least 2 hours.
 - 4. Determine leakage by measuring the quantity of water added to the main to maintain the specified test pressure.
 - 5. Unless noted otherwise, minimum test water pressure shall be the greater of 1.5 times the working pressure or the following:
 - a. Mains or process piping carrying water – 150 pounds per square inch (psi).
 - b. Existing 16” force mains – 100 psi.

3.4 **STORAGE TANK LEAKAGE TESTING.** Demonstrate water tightness of all liquid-bearing tanks in accordance with ACI 350.1, "Tightness Testing of Environmental Engineering Concrete Structures."

3.5 **FIELD QUALITY CONTROL**

- A. **Field Tests**
 - 1. Provide all test materials, equipment, chemicals, and water required for testing at no additional cost to the Owner.
 - 2. Perform testing according to the methods described in this section.

- B. **Witness**
 - 1. All leakage tests shall be witnessed and approved before acceptance.
 - 2. Any test performed without witness by the OWNER, may require retesting the section in conformance with this specification at no cost to the Owner.

C. **Test Results**

1. If the field tests show excessive leakage, repair, adjust, modify, or replace the noncomplying sections until the tests are successfully completed.
2. This shall be done at no additional cost to the Owner.

3.6 **CLEANING AND DISPOSAL.** Remove and dispose of all excess material and debris as a result of the work completed under this section, including testing procedures.

3.7 **PROTECTION**

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

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, and equipment necessary to remove and salvage or dispose of the structures or portions thereof as shown on the drawings and specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all demolition and disposal work in compliance with all federal, state, and local codes and regulatory agencies.
- B. **Protection.** Ensure safe passage of persons and vehicles around area of demolition. Conduct operations to prevent damage to adjacent buildings, structures, and other facilities and injury to persons.

1.4 SUBMITTALS

- A. **Schedule of Demolition.** Submit to the Owner a proposed schedule of demolition for the purposes of coordinating shutoff, capping, and continuation of utility services as required to operate the facility.
- B. **Photographs.** Submit photographs of adjacent areas and structures affected by this demolition.

1.5 JOB CONDITIONS

- A. **Beginning Work.** Structures to be demolished will be vacated and their use discontinued prior to start of work.
- B. **Protection**
 - 1. **Structural.** Prior to the removal of any wall, beam, or column, or cutting of any openings, examine the existing structure and, when required, protect the structure by shoring, bracing, or underpinning.
 - 2. **Equipment and Tanks.** Protect all equipment and tanks from dust, dirt, debris, and damage by covering with planking and tarpaulins during demolition.
- C. **Explosives.** Do not use explosives.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **General.** Handle, store, and protect items removed and stored or reset in accordance with Section 01 60 00 "Materials and Equipment" and the manufacturer's instructions.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. **Site Verification.** Verify the actual areas, structures or parts of structures, pipes, or other items to be demolished in the presence of the OWNER.

3.2 **PREPARATION**

- A. **Equipment and Manpower.** Have all required equipment and manpower available at the job site prior to beginning of demolition. This includes any special equipment to permit continued uninterrupted Owner operations as required.
- B. **Coordination.** Provide adequate but no less than 48 hours of notice when any Owner operations are affected by demolition.

3.3 **DEMOLITION**

- A. **Demolition Schedule.** Perform demolition work in accordance with the final approved schedule of demolition.
- B. **Salvage**
 - 1. **Material and Equipment.** Remove with care, clean, and store at the site in an approved area all material and equipment designated to be salvaged and store onsite at direction of Owner.
- C. **Openings**
 - 1. **Concrete.** Close concrete openings using a non-shrink, nonmetallic grout.
 - 2. **New.** Neatly cut or drill new openings to prevent face chipping or spalling. Repair all damaged areas to a condition equivalent to that which existed prior to the start of work.

D. **Patching Concrete**

1. Repair all concrete that has been marred, damaged, or defaced as a result of demolition. See concrete repair requirements in Section 03 30 00, "Cast-in-Place Concrete".
2. Procedure. Repair concrete surfaces as follows:
 - a. Saw cut and remove concrete to a depth of not less than 1 inch.
 - b. Remove exposed reinforcing where noted.
 - c. Apply an approved bonding agent to the cut surface.
 - d. Patch with a non-shrink, nonmetallic grout finished to match the existing surface unless noted otherwise.

E. **Anchors.** Cut all embedded anchors of removed items flush with the existing surface and grind metal 1 inch minimum below surface and patch per Item D above.

F. **Pipe.** Plug all abandoned pipe at each end.

G. **Cleanup.** Remove from the site all debris, rubble, unusable materials, and items not salvaged.

END OF SECTION

SECTION 03 41 00

STRUCTURAL PRECAST CONCRETE - PLANT CAST

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **General.** Furnish the labor, tools, equipment, and materials necessary to furnish and install structural precast concrete in accordance with the plans and as specified herein.

- B. **This section includes structural precast concrete units**, including the following:

- 1. Structural slab units.

- C. **Related Sections.** The following sections contain requirements that relate to this section.

- 1. Cast-in-place concrete is specified in Division 3 section "Cast-In-Place Concrete."
- 2. Joint sealants and backing are specified in Division 7 section "Joint Sealants."

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Comply with provisions of following codes, specifications and standards, except as otherwise indicated:

- 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
- 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
- 3. American Welding Society (AWS) D1.1, "Structural Welding Code: Steel."
- 4. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
- 5. Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products."

- B. **Fabricator Qualifications.** Firm experienced in fabrication of precast concrete units similar to units required for this project and that have a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in work.

1. Fabricator must be a producer member of the Prestressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.
- C. **Fabrication Qualifications.** Produce precast concrete units at fabricating plant engaged primarily in manufacturing of similar units, unless plant fabrication or delivery to project site is impractical.
1. If units are not produced at precast concrete fabricating plant, maintain procedures and conditions for quality control that are equivalent to plant production.

1.4 SUBMITTALS

- A. **General.** Submit the following according to Conditions of Contract and Division 1 specification sections.
1. Product data and instructions for manufactured materials and products. Include manufacturer's certifications and laboratory test reports as required.
 2. Mix design reports of proposed concrete mix as specified in Part 2 of this section.
 3. Shop drawings prepared by or under the supervision of a qualified professional engineer, showing complete information for fabrication and installation of precast concrete units. Indicate member dimensions and cross section; location, size, and type of reinforcement, including special reinforcement; and lifting devices necessary for handling and erection.
 - a. Indicate layout and dimensions, and identify each precast unit corresponding to sequence and procedure of installation. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.
 - b. Provide location and details of anchorage devices that are to be embedded in other construction. Furnish templates, if required, for accurate placement.
 4. Test reports as required by provisions of this section.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. **Deliver the amount of precast concrete** units needed in a timely manner to the project site to ensure installation continuity.

- B. **Store and handle the units** at the project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.
- C. **Deliver anchorage items** that are to be embedded in other construction before starting such work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 FORMWORK

- A. **Provide forms and, where required, form facing** materials of metal, plastic, wood, or another acceptable material that is nonreactive with concrete and will produce required finish surfaces.
- B. **Accurately construct forms**, mortar tight, of sufficient strength to withstand pressures due to concrete placing operations, temperature changes, and for prestressed, pretensioning, and detensioning operations. Maintain formwork to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified in PCI MNL 116.

2.2 REINFORCING MATERIALS

- A. **Reinforcing Bars.** ASTM A 615, Grade 60, deformed.
- B. **Low Alloy Steel Reinforcing Bars.** ASTM A 706.
- C. **Steel Wire.** ASTM A 82, plain, cold drawn steel.
- D. **Welded Wire Fabric.** ASTM A 185.
- E. **Welded Deformed Steel Wire Fabric.** ASTM A 497.
- F. **Supports for Reinforcement.** Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.
 - 1. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. **Portland Cement.** ASTM C 150, Type I or Type III.
- B. **Use only one brand and type** of cement throughout project, unless otherwise acceptable to Engineer/Architect.
- C. **Aggregates.** ASTM C 33, and as specified here. Provide aggregates from a single source for exposed concrete.
 - 1. Local aggregates not complying with ASTM C 33, but that have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable.
- D. **Lightweight Aggregate.** ASTM C 330.
- E. **Water.** Potable.
- F. **Admixtures, General.** Provide admixtures for concrete that contain not more than 0.1 percent chloride ions.
- G. **Air-Entraining Admixture.** ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. **Water-Reducing Admixture.** ASTM C 494, Type A, or other Type approved for fabricator's units.

2.4 CONNECTION MATERIALS

- A. **Steel Plates.** Structural quality, hot rolled carbon steel, ASTM A 283, Grade C.
- B. **Steel Shapes.** ASTM A 36.
- C. **Anchor Bolts.** ASTM A 307, low carbon steel bolts, regular hexagon nuts, and carbon steel washers.
- D. **High-Strength Threaded Fasteners.** Heavy hexagon structural bolts, and hardened washers complying with ASTM A 325.
- E. **Bearing Pads.** Provide bearing pads for precast concrete units as indicated on drawings.
 - 1. Elastomeric Pads. Vulcanized, chloroprene elastomeric compound, molded to size or cut from a molded sheet, 50-60 shore A durometer.
 - 2. Laminated Fabric Rubber Pads. Preformed, unused synthetic fibers and new, unvulcanized rubber. Surface hardness of 70-80 shore A durometer.
- F. **Welding Electrodes.** Comply with AWS standards.

- G. **Accessories.** Provide clips, hangers, and other accessories required to install project units and to support subsequent construction or finishes.

2.5 GROUT MATERIALS

- A. **Cement Grout.** Portland cement, ASTM C 150 (Type I), and clean, natural sand, ASTM C 404. Mix at ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement and hydration.

2.6 MIX PROPORTION AND DESIGN

- A. **Prepare design mixes** for each type of concrete required.
- B. **Design mixes may be prepared** by independent testing facility or by qualified precast manufacturing plant personnel at precast manufacturer's option.
- C. **Proportion mixes** by either laboratory trial batch or field experience methods using materials to be employed on the project for each type of concrete required complying with ACI 318.
 - 1. Produce standard weight concrete consisting of specified portland cement, aggregates, admixtures, and water to produce the following properties:
 - a. Compressive strength - 5,000 psi minimum at 28 days.
 - 2. Cure compression test cylinders using same methods as for precast concrete work.
- D. **Submit written reports** of proposed mix for each type of concrete at least 15 days prior to start of precast unit production. Do not begin concrete production until mixes and evaluations have been reviewed.
- E. **Adjusting Concrete Mixes.** Mix design adjustments may be requested when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Submit laboratory test data for revised mix designs and strength results for acceptance before use in the work.
- F. **Admixtures.** Use air-entraining admixture in concrete, unless otherwise indicated.
 - 1. Use water-reducing admixtures in strict compliance with manufacturer's directions. Admixtures to increase cement dispersion, or provide increased workability for low slump concrete, may be used subject to acceptance.
 - 2. Use amounts as recommended by admixture manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.

2.7 FABRICATION

- A. **General.** Fabricate precast concrete units complying with manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-116 and as specified for types of units required.
- B. **Job Site Casting.** Use ready-mix concrete for units produced at a location other than the precast concrete fabricating plant complying with ASTM C 94.
- C. **Ready-Mixed Concrete.** Comply with requirements of ASTM C 94 and as specified here.
 - 1. Delete references for allowing additional water to be added to the batch for material with insufficient slump. Adding water to the batch is not permitted.
- D. **A shorter mixing time than that specified** in ASTM C 94 may be required during hot weather or under conditions contributing to rapidly setting concrete.
 - 1. When the air temperature is between 85 degrees Fahrenheit ($^{\circ}$ F.) (30 degrees Celsius [$^{\circ}$ C.]) and 90 $^{\circ}$ F. (32 $^{\circ}$ C.), reduce mixing and delivery time from 1 1/2 hours to 75 minutes. When air temperature is above 90 $^{\circ}$ F. (32 $^{\circ}$ C.), reduce mixing and delivery time to 60 minutes.
- E. **Built-In Anchorages.** Accurately position built-in anchorage devices and secure to formwork. Locate anchorages where they do not affect the position of the main reinforcement or placing of concrete. Do not relocate bearing plates in units
- F. **Cast in openings larger than 10 inches** in diameter or 10 inches square in accordance with final shop drawings. Other smaller holes may be field-cut by trades requiring them, as acceptable.
- G. **Coat surfaces of forms** with bond breaking compound before reinforcement is placed. Provide commercial formula form coating compounds that will not bond with, stain, or adversely affect concrete surfaces, and that will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply in compliance with manufacturer's instructions.
- H. **Clean reinforcement of loose rust** and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
- I. **Accurately position,** support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcement by metal chairs, runners, bolsters, spacers and hangers, as required.
- J. **Place reinforcement** to obtain at least the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

- K. **Place concrete** in a continuous operation to prevent seams or planes of weakness from forming in precast units, complying with requirements of ACI 304. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items.
- L. **Identify pick-up points and orientation** in structure with permanent markings, complying with markings indicated on final shop drawings. Imprint casting date on each precast unit on a surface that will not show in the finished structure.
- M. **Cure by low-pressure steam**, steam vapor, radiant heat and moisture, or another similar process to accelerate concrete hardening and to reduce curing time.
- N. **Finish formed surfaces** of precast concrete as indicated for each type of unit, and as follows:
 - 1. **Standard Finish.** Normal plant run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations and form joint marks, and minor chips and spalls will be tolerated. Major or unsightly imperfections, honeycomb, or structural defects are not permitted.
 - 2. **Commercial Finish.** Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces are to be true, well defined surfaces.
- O. **Finish unformed surfaces** by trowel unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth uniform finish.

2.8 STRUCTURAL SLAB UNITS

- A. **Type.** Solid, monolithic precast slab units. Fabricate solid units to dimensions indicated.
- B. **Furnish units that are free of voids** or honeycomb, with straight true edges and surfaces.
- C. **Provide standard finish units** unless otherwise indicated.
- D. **Fabricate units of concrete materials** that will provide a minimum 3500 psi compressive strength at the time of stripping from forms and a 28-day compressive strength of 5,000 psi.
- E. **Adequately reinforce slab units** to resist transportation and handling stresses..
- F. **Coordinate with other trades** for installation of items to be cast-in hollow slab units.

2.9 SOURCE QUALITY CONTROL

- A. **The Owner may employ** an independent testing laboratory to evaluate precast manufacturer's quality control and testing methods.
- B. **The precast manufacturer shall allow** Owner's testing facility access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.
- C. **Dimensional Tolerances.** Units having dimensions smaller or greater than required and outside specified tolerance limits may be subject to additional testing as specified here.
- D. **Precast units having dimensions greater than required** will be rejected if the appearance or function of the structure is adversely affected or if larger dimensions interfere with other construction. Repair or remove and replace rejected units, as required, to meet construction conditions.
- E. **Strength of precast concrete units** will be considered potentially deficient if the manufacturing processes fail to comply with any of the requirements that may affect the strength of the precast units, including the following conditions:
1. Failure to meet compressive strength tests requirements.
 2. Reinforcement and pretensioning and detensioning tendons of prestressed concrete not conforming to specified fabrication requirements.
 3. Concrete curing, and protection of precast units against extremes in temperature not as specified.
 4. Precast units damaged during handling and erection.
- F. **Testing Precast Units.** When there is evidence that the strength of precast concrete units may not meet specification requirements, the Owner's testing laboratory will take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C 42 and as follows:
1. Take at least three representative cores from precast units of suspect strength, from locations directed by Engineer/Architect.
 2. Test cores in a saturated surface dry condition per ACI 318 if concrete will be wet when using completed structure.
 3. Test cores in an air dry condition per ACI 318 if concrete will be dry when using completed structure.
 4. Strength of concrete for each series of cores will be considered satisfactory if the average compressive strength is at least 85 percent of 28-day design compressive strength.
 5. Test results will be made in writing on the same day that tests are made, with copies to Engineer, Contractor, and precast manufacturer. Include in the test reports the project identification name and number, date, name of precast concrete manufacturer, name of concrete testing laboratory; identification letter, name, and type of member or members represented by core tests; design compressive strength, compression breaking strength and type of break (corrected for length diameter ratio), and

direction of applied load to core with respect to horizontal plane of concrete as placed.

- G. **Patching.** Where core test results are satisfactory and precast units are acceptable for use in work, solidly fill core holes with patching mortar and finish to match adjacent concrete surfaces.
- H. **Defective Work.** Remove precast concrete units that do not conform to specified requirements, including strength, tolerances, and finishes. Replace with precast concrete units that meet requirements of this section.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. **Bearing Pads.** Install flexible bearing pads where indicated as precast units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.
- B. **Welding.** Perform welding in compliance with AWS D 1.1 and D 1.4, including qualification of welders.
 - 1. Protect units from damage by field welding or cutting operations and provide noncombustible shield as required.
 - 2. Repair damaged metal surfaces by cleaning and applying a coat of liquid galvanizing repair compound to galvanized surfaces and a compatible primer to painted surfaces.
- C. **Powder-Actuated Fasteners.** Do not use powder-actuated fasteners for attaching accessory items to the surface of a precast unit unless otherwise accepted by precast manufacturer.
- D. **Erection Tolerances.** Install precast units without exceeding tolerance limits specified in PCI MNL-127 "Recommended Practice for Erection of Precast Concrete."
 - 1. Grouting Connections and Joints. After precast concrete units have been placed and secured, grout open spaces at connection and joints as follows:
 - 2. Cement grout consisting of 1 part portland cement, 2 1/2 parts sand, and only enough water to properly mix and hydrate.
 - 3. Shrinkage resistant grout consisting of premixed compound and water to provide a flowable mixture without segregation or bleeding.
 - 4. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it hardens.

END OF SECTION

SECTION 03 62 00

GROUTING, NON-SHRINK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to furnish and install the non-shrink grout in accordance with the drawings and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all work to furnish and install the non-shrink grout in compliance with all federal, state, and local codes and regulatory agencies.
- B. **Standards.** Materials and workmanship shall be in accordance with the following standards referenced herein.
 - 1. ASTM - American Society for Testing and Materials.

1.4 SUBMITTALS

- A. **Product Data.** Submit manufacturer's technical data and installation instructions for each type of grout. Technical data shall show manufacturer's trade name, color, all independent laboratory tests, performance data, method of application, storage requirements, safety fact sheet, container sizes, and mixing instructions.

1.5 JOB CONDITIONS

- A. **Surface Preparation.** Clean all surfaces to be grouted of loose mortar and concrete and all dirt and oil.
- B. **Coordination.** Coordinate all work with other trades to prevent delays, omissions, damage, and/or interference with other work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. **Delivery.** Grout shall be delivered to the site in sealed containers bearing a label which shall list the manufacturer's name, trade name, application rate, precautionary methods required, and mixing ratio.
- B. **Storage.** Store materials in an enclosed dry area, protected from damage and moisture. Keep storage areas clean and neat at all times.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIAL

- A. **Grout shall be non-shrink**, non-metallic, non-staining, capable of developing a minimum compressive strength of 9,000 pounds per square inch (psi) at 28 days, when tested in 2 inch cubes in accordance with ASTM C-109. Grout shall be free of any metal, plastic, gypsum, and chemicals, and guaranteed not to shrink below its original placement volume at any time.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Verification.** Confirm that all dimensions, elevations, and tolerances are correct prior to placing grout. Equipment shall be free of any vibration and properly supported when operated prior to placing grout.

3.2 PREPARATION

- A. **Surface Preparation.** Clean all areas to be grouted so they are free of all oils, grease, laitance, loose particles, and foreign materials. Thoroughly wet all concrete to be grouted leaving no puddles prior to grouting.

3.3 INSTALLATION

- A. **Placement.** Mix and place non-shrink grout in accordance with the manufacturer's instructions. Fill all voids and spaces, trim excess grout, and finish surface to match adjoining surfaces or as directed. Maintain a surface temperature of not less than 50 degrees F for 7 consecutive days after placing the grout and keep the grout wetted for 3 consecutive days after placing.
- B. **Items to Be Grouted (Where Applicable)**
 - 1. Pipe, Equipment, Leveling Plates, and Base Plates. After shimming equipment to proper grade, securely tighten anchor bolts. Properly form around the base plates, allowing sufficient room around the edges for placing the grout. Provide adequate depth between the bottom of the base plate and the top of the concrete base to ensure that the void is completely filled with grout.
 - 2. Contractor to sweep in a maximum of 3" new grout over existing floor per clarifier manufacturer's requirements and specifications. Grout shall be supplied by concrete plant.
 - 3. Box Outs and Closing of Openings. Grout all box outs and other openings approved due to late deliveries and required to maintain the work schedule full as shown on the drawings and as specified under paragraph 3.3 A of this section.
 - 4. Recessed floor area of existing screen channel.

3.4 **FIELD QUALITY CONTROL**

- A. **Areas to Be Grouted.** Observe and confirm that all surfaces to be grouted are cleaned of loose mortar and concrete and all dirt and oil.

- B. **Shrinkage Cracks.** Visually inspect grouted areas after 3 months and 1 year for evidence of shrinkage cracks. Replace any grout which shows evidence of cracks.

END OF SECTION

SECTION 05 00 00

MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to furnish and install the miscellaneous metals in accordance with the drawings and the specifications.

1.3 QUALITY ASSURANCE

- A. **Fabricator Qualifications.** Fabrication shall meet requirements of the American Institute of Steel Construction (AISC) standards.
- B. **Standards.** Ensure that materials and workmanship are in accordance with the following standards referenced herein.
 - 1. AASHTO – American Association of State Highway and Transportation Officials.
 - 2. AISC.
 - 3. ASTM – American Society for Testing and Materials.
 - 4. AWS – American Welding Society.
 - 5. OSHA – Occupational Safety and Health Administration.

1.4 SUBMITTALS

- A. **Submit the following** in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. **Submittal Package No. 1 – Shop Drawings and Product Data**
 - 1. Schedule. No products shall be delivered or installed before this submittal package has been reviewed and approved.
 - 2. Submittal Package Contents.
 - a. Manufacturer's name and model numbers.
 - b. Manufacturer's standard product data and equipment specifications.
 - c. Materials of construction.
 - d. Dimensional layouts and required clearances.
 - e. Connections including welding.
 - f. Weights.
 - g. Anchors.

- h. Bill of material.
- i. Coatings.
- j. Complete description in sufficient detail to permit an item by item comparison with the specifications.
- k. Manufacturer's instructions.
- l. Warranties.

1.5 **JOB CONDITIONS**

- A. **Field-verify all dimensions, locations, and elevations** of anchors, bolts, plates, openings, and other miscellaneous metal items and be responsible for their proper fit.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **In accordance with Section 01 60 00 "Materials and Equipment"** and the manufacturer's instructions.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **GENERAL**

- A. **Design**
 - 1. Proportion components not sized on the plans to provide ample strength and stiffness for the loads expected.
 - 2. All steel shall meet the strength requirements of ASTM A 36.
 - 3. Members designated as such on drawings shall be stainless steel.
- B. **Fabrication.** Fabricate the miscellaneous metals in accordance with the approved shop drawings.

2.2 **EQUIPMENT**

- A. **Structural Shapes**
 - 1. Structural shapes shall be Type 304L stainless steel, unless noted otherwise.
 - 2. All structural shapes shall be as required to complete the work. All anchors, connections, bearing plates, and fabrication details shall be standard, unless otherwise noted.
- B. **Fasteners for aluminum or stainless steel** shall be Type 316 stainless steel.
- C. **Anchor Bolts.** In accordance with model called out on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Take field measurements** prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

3.2 PREPARATION

- A. **Coordinate and furnish anchorages**, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor rods, and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.3 GENERAL

A. Fasteners

1. Conceal fasteners where practical.
2. Countersink all bolts, properly sized, and of proper length to permit full thread in the nut and project not more than a 1/4 inch beyond the nut.
3. Provide lock washers at all nuts and nick the bolt to prevent loosening.
4. All welds shall be smooth and regular, solid, and homogeneous throughout and free from pits, slag, scale, and other defects.
5. Make joints exposed to weather watertight with gaskets or continuous welding.
6. Grind smooth all welds in exposed finished work.

- B. **Holes.** Drill or punch all holes with clean, true lines and surfaces.

C. Welding

1. Unless otherwise shown, all welding shall be continuous along all adjoining planes and shall produce a neat, even finish and smooth appearance.
2. Conform to welding requirements of AWS.
3. Weld stainless steel conforming to materials and procedures set forth in "The Procedure Handbook of Arch Welding" by Lincoln Electric Co. or other approved procedures.

3.4 INSTALLATION

- A. **Fabricate and install** the miscellaneous metals specified herein as shown and in accordance with approved shop drawings and the manufacturer's recommendations.

END OF SECTION

SECTION 05 05 23

ANCHORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

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

1.3 QUALITY ASSURANCE

- A. **Standards.** Ensure that materials and workmanship are in conformance with the following standards as referenced herein:
 - 1. AISI – American Iron and Steel Institute.
 - 2. ASTM – American Society for Testing and Materials.

1.4 SUBMITTALS

- A. **Submit the following submittals** in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. **Submittal Package No. 1 – Shop Drawings, Product Data, and Design Criteria**
 - 1. Schedule. No products shall be delivered or installed before this submittal package has been reviewed and approved.
 - 2. Submittal Package Contents.
 - a. Copies of manufacturer's specifications, load tables, data, and dimension diagrams for the devices including manufacturer's recommended working load for each size and type of anchor proposed for use.
 - b. Certification that materials conform to ASTM specifications.
 - c. Certification that products conform to requirements of Underwriters' Laboratory or Factory Mutual.
 - d. Setting drawings and templates for location and installation of anchorage devices.
 - e. Anchor rods and bolts showing dimensions and material of construction.
 - f. When the size, length, or load carrying capacity of an anchor rod, expansion anchor, and adhesive anchor is not shown on the drawings, provide the size, length, and capacity required to carry the design load times a minimum safety factor of four.

LLMWWTP IMPROVEMENTS

- g. Design Loads. Those imposed by the service conditions and as follows:
 - 1) Equipment Anchors. Use the design load recommended by the equipment manufacturer and accepted by the Owner or Engineer.
 - 2) Allowances for vibration are included in the safety factor specified above.
- h. Design Data. Provide design load documentation and calculations for items sized or selected.
- i. Installation instructions for adhesive anchors.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIALS/MANUFACTURERS

A. Threaded and Nutted Anchor Rods

- 1. In accordance with ASTM A 276, AISI Type 316.
- 2. Nuts in accordance with ASTM F 594, Group 2, and tack-welded to anchor rod.

B. Cracked Concrete Anchors

- 1. Provide cracked concrete anchors where International Building Code (IBC) 2006 is the design code and specified on the drawing details. Anchors that are approved for "cracked concrete" situations shall meet the requirements stated in ACI-318-05 Appendix D.
- 2. Manufacturers. Subject to compliance with the specifications, provide cracked concrete anchors from one of the following approved manufacturers.

a. Expansion Anchors

- 1) Simpson, Strong-Bolt.
- 2) Hilti, Inc., Kwik-Bolt-TZ.
- 3) Simpson Titan-HD.

- 4) Hilti HSL-3.
- 5) Hilti HDA.

b. Adhesive Anchors

- 1) Simpson SET-XP
- 2) Hilti HIT-RE 500 V3

C. **Expansion Anchors**

- 1. Provide stainless steel expansion anchors, nuts, and washers complying with ASTM A 276, AISI Type 316.
- 2. Expansion anchors shall be Underwriters' Laboratories, Factory Mutual, or International Code Council – Evaluation Service (ICC-ES) approved.
- 3. Subject to compliance with the specifications, provide expansion anchors from one of the following approved manufacturers.
 - a. Simpson, Wedge-All.
 - b. Wej-it Corporation.
 - c. Hilti, Inc., Kwik-Bolt TZ.
 - d. Ramset Company, Red Head, Trubolt.

D. **Adhesive Anchors**

- 1. Provide adhesive cartridge as recommended by the manufacturer for the loading and depth required.
- 2. Provide Type 316 stainless steel threaded rod, nut, and washer or a reinforcing bar of the size and embedment shown on the drawings and in accordance with ASTM A 615, Grade 60.
- 3. Subject to compliance with the specifications, provide adhesive cartridges from one of the following approved manufacturers.
 - a. Simpson, SET Epoxy.
 - b. Simpson, AT Acrylic Adhesive.
 - c. Hilti, HIT-HY 200.
 - d. ITW/Red Head, Ceramic 6 Epoxy.
 - e. Hilti HIT-RE 500 V3.

E. **Adhesive-Anchored Reinforcing Bar.**

- 1. Provide adhesive cartridges as recommended by the manufacturer to receive reinforcing bar as noted.
- 2. Manufacturer/Model. Subject to compliance with the specifications, provide adhesive cartridges from one of the following approved manufacturers.
 - a. Simpson, SET Epoxy.
 - b. Simpson, AT Acrylic Adhesive.
 - c. Hilti HIT-RE 500 V3.
 - d. ITW/Red Head, Ceramic 6 Epoxy.
 - e. Hilti HIT-HY 200.

3. Reinforcing Bar. Comply with Section 03 30 00 "Cast-in-Place Concrete."
- F. **Powder-Actuated Fasteners.** Do not use powder-actuated fasteners and other types of bolts and fasteners.

PART 3 - EXECUTION

3.1 **EXAMINATION**

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

3.2 **PREPARATION**

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

3.3 **INSTALLATION**

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

3.4 **FIELD QUALITY CONTROL**

- A. **Inspection.** Inspect each installation for compliance with this specification and manufacturer's recommendations.
- B. **Testing.** At the discretion of the Owner, adhesive anchors may be subjected to pullout-type testing up to the manufacturer's recommended working load for the anchor. If deficient anchors are found, the Contractor will be required to test all anchors and replace any deficient anchors found at no additional cost to the Owner.
- C. **Material Testing**
 - 1. At the discretion of the Owner up to 1 percent or up to three (whichever is greater) of each type and size of bolt, nut, washer, and anchor from each and every separate shipment or purchasing lot that are specified to be Type 316 stainless steel may be destructively tested to verify material requirements.
 - 2. Samples will be randomly selected for this testing and be provided at no additional cost to the Owner.
 - 3. Conduct testing at the Owner's expense.
 - 4. The above testing may be performed at any time during the Contract or warranty period.
 - 5. Any shipment or purchasing lot, installed or not, which fails to meet the requirements of the specifications will be rejected and shall be immediately removed from the job site and replaced with material that meets the specifications.
 - 6. Removal and replacement of noncomplying material shall be at the Contractor's expense.

3.5 **CLEANING**

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

END OF SECTION

SECTION 05 10 00

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to furnish and install the structural steel in accordance with the plans and specifications.
- B. **Types.** This section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown.
 2. Miscellaneous metal fabrications are specified elsewhere in Division 5.
 3. Refer to Division 3 for anchor bolt installation in concrete and Division 4 for anchor bolt installation in masonry.

1.3 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all work to furnish and install the structural steel in compliance with all federal, state, and local codes and regulatory agencies. Comply with provisions of following, except as otherwise indicated:
1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:
 - 1) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."
 2. AISC "Specifications for Structural Steel Buildings," including "Commentary."
 3. "Specifications for Structural Joints Using American Society for Testing and Materials (ASTM) A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.

4. ASTM A 6 "General Requirements for Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
- B. **Fabrication shall meet requirements** of the American Institute of Steel Construction (AISC) standards.
- C. **Qualifications for Welding Work.** Qualify welding procedures and welding operators in accordance with American Welding Society (AWS) "Qualification" requirements.
 1. If recertification of welders is required, retesting will be Contractor's responsibility.

1.4 **SUBMITTALS**

- A. **General.** Submit the following in accordance with Conditions of Contract and Division 1 specification sections.
- B. **Product Data.** Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 1. Structural steel primer paint.
 2. Shrinkage resistant grout.
- C. **Shop drawings prepared under supervision** of a licensed Professional Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
- D. **Test reports conducted on field-bolted** and welded connections. Include data on type(s) of tests conducted and test results.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **General.** Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. **Deliver anchor bolts** and anchorage devices which are to be embedded in cast-in-place concrete or masonry in ample time as not to delay work.

- C. **Store materials to permit easy access** for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- A. **Structural Steel Wide Flange Shapes.** ASTM A 992.
- B. **Structural Steel Shapes, Plates, and Bars.** ASTM A 36 unless noted otherwise.
- C. **Cold-Formed Steel Tubing.** ASTM A 500, Grade B.
- D. **Steel Pipe.** ASTM A 53, Type E or S, Grade B; or ASTM A 501.
 - 1. Finish. Black, except where indicated to be galvanized.
- E. **Steel Castings.** ASTM A 27, Grade 65-35, medium-strength carbon steel.
- F. **Headed Stud-Type Shear Connectors.** ASTM A 108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC specifications.
- G. **Anchor Bolts and Threaded Rods.** ASTM A F 1554, Grade 36, headed type unless otherwise indicated.
- H. **Unfinished Threaded Fasteners.** ASTM A 307, Grade A, regular low-carbon-steel bolts and nuts.
 - 1. Provide hexagonal heads and nuts for all connections.
- I. **High-Strength (and Alternate Fastener Design) Threaded Fasteners.** Heavy hexagonal structural bolts, heavy hexagonal nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium carbon steel bolts, nuts, and washers, complying with ASTM A 325.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot dip galvanized complying with ASTM A 153.

- J. **Direct Tension Indicators.** ASTM F 959, type as required.
 - 1. Use on all A 325 bolts in connections that are slip critical.
- K. **Electrodes for Welding.** Comply with AWS Code.
- L. **Structural Steel Primer Paint.** Steel Structures Painting Council (SSPC) - Paint 2 oil alkyd unless specified otherwise in Section 09 90 00 "Painting."
- M. **Galvanizing.** Where hot-dip galvanizing or hot zinc coating is noted, it shall be done in accordance with ASTM A 123. See Section 05 05 14 "Galvanizing."
- N. **Nonmetallic, Shrinkage Resistant Grout.** Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing, and water-reducing agents, complying with ASTM C 1007.
 - 1. Available Products. Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to, the following:
 - a. Sure Grip Grout; Dayton Superior.
 - b. Euco N.S.; Euclid Chemical Co.
 - c. Crystex; L & M Construction Chemicals, Inc.
 - d. Masterflow 713; Master Builders.
 - e. Sealtight 588 Grout; W. R. Meadows.
 - f. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

- A. **Shop-Fabrication and Assembly.** Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
 - 1. Properly mark and match mark materials for field-assembly. Fabricate for delivery sequence that will expedite erection and minimize field-handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. **Remove all surface blemishes** including rust and scale seam marks, roller marks, rolled trade names, and roughness by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes to steel which is exposed to view.
- C. **Anchor Bolts.** Provide anchor bolts where indicated on the drawings.

- D. **Connections.** Weld or bolt shop connections, as indicated.
1. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.
 2. Design connections to develop 55 percent of the load capacity of the member as tabulated in the beam tables, Part 2, of the AISC "Manual of Steel Construction" unless reactions or specific details are shown.
 3. Connections for bracing shall be designed to develop full strength of bracing members unless forces are shown.
- E. **Bolt field connections,** except where welded connections or other connections are indicated.
- F. **High-Strength Bolted Construction.** Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts."
- G. **Welded Construction.** Comply with AWS code and appearance requirements specified herein.
- H. **Shear Connectors.** Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions and AWS D1.1 requirements.
- I. **Steel Wall Framing.** Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- J. **Build up welded door frames** attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross recessed-head machine screws, uniformly spaced not more than 10 inches on center (o.c.), unless otherwise indicated.
- K. **Holes for Other Work.** Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members.
- L. **Provide threaded nuts** welded to framing and other specialty items as indicated to receive other work.
- M. **Cut, drill, or punch holes** perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- N. **Expansion Joints.** Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

2.3 SHOP PAINTING

- A. **General.** Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 - 3. Apply two coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. **Surface Preparation.** After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with SSPC as follows:
 - 1. SP-6 "Commercial Blast Cleaning," unless specified otherwise in Section 09 90 00 "Painting."
- C. **Painting.** If not specified otherwise in Section 09 90 00 "Painting," immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.4 SOURCE QUALITY CONTROL

- A. **General.** Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 1. Promptly remove and replace materials or fabricated components that do not comply.
- B. **Design of Members and Connections.** Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 - 1. Promptly notify Engineer/Architect whenever design of members and connections for any portion of structure are not clearly indicated.
 - 2. For connections not detailed on the plans and unless specific reactions, moments, shears, and axial forces are indicated, provide beam connections designed for the reaction due to the maximum uniform load which the beam can support at the span shown. Use the beam tables in the AISC "Manual of Steel Construction, Allowable Stress Design."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Surveys.** Employ a licensed Land Surveyor for accurate erection of structural steel. Report discrepancies to Engineer/Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steelwork have been agreed upon.
 - 1. Check elevations of concrete and masonry bearing surfaces and location of anchor bolts and similar devices.
 - 2. Check camber and sweep of structural members and compare to permissible variations in AISC "Manual of Steel Construction."
 - 3. Check levelness and elevations of leveling plates and bearing plates.
- B. **Examine all structural steel** and discard all damaged members.

3.2 PREPARATION

- A. **Anchor Bolts.** Provide anchors as to not delay work.
 - 1. Provide setting drawings to ensure accurate placement.
- B. **Temporary Shoring and Bracing.** Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds and to resist wind and earthquake loads.
- C. **Temporary Planking.** Provide temporary planking and working platforms as necessary to effectively complete work.
- D. **Setting Bases and Bearing Plates.** Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 4. For proprietary grout materials, comply with manufacturer's instructions.

3.3 ERECTION

- A. **General.** Comply with Occupational Safety and Health Administration (OSHA) and state safety requirements.
- B. **Field-Assembly.** Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other

surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

- C. **Straightening of structural steel sections** by heating shall not be permitted unless approved.
- D. **Level and plumb individual members** of structure within specified AISC tolerances.
- E. **Splice members** only where indicated and accepted on shop drawings.
- F. **Erection Bolts.** On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- G. **Gas Cutting.** Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress as acceptable. Finish gas-cut sections equal to a sheared appearance when permitted.
- H. **Touch-Up Painting.** Unless otherwise specified in Section 09 90 00 "Painting," immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.4 QUALITY CONTROL

- A. **General.** Engage an independent testing and inspection agency to inspect, perform test, and prepare test reports on high-strength bolted connections and welded connections. Welds will be visually inspected and some or all welds will be nondestructively tested.
- B. **Testing agency shall conduct** and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations from them.
- C. **Provide fabrication schedule** for testing agency so that required inspection and testing can be accomplished.
- D. **Provide access for testing agency** to places where structural steelwork is being fabricated or produced and to the construction site so that required inspection and testing can be accomplished.

- E. **Testing agency may inspect structural steel** at plant before shipment.
- F. **Testing agency will inspect structural steel** at the site.
 - 1. Field-Bolted Connections. Inspect in accordance with Research Council on Structural Connections (RCSC) "Specification for Structural Joints Using A 325 or A 490 Bolts."
 - a. For direct tension indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.
 - 2. Field-Welding. Inspect and test during erection of structural steel in accordance with Section 6 of AWS D1.1.
 - a. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - b. Perform visual inspection of all welds.
 - c. Perform tests on 100 percent of the full and partial penetration welds as follows. Inspection procedures listed are to be used at Contractor's option.
 - 1) Liquid Penetrant Inspection. ASTM E 165.
 - 2) Magnetic Particle Inspection. ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.
 - 3) Radiographic Inspection. ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - 4) Ultrasonic Inspection. ASTM E 164.
 - 3. Steel Framing. Inspect and verify compliance with the details shown on the approved Contract Documents.
- G. **Correct deficiencies in structural steel work** that independent inspections and laboratory test reports have indicated to be not in compliance with Contract Documents. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

END OF SECTION

SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to furnish and install the pipe and tube railings in accordance with the plans and specifications.
- B. **This section includes the following:**
 - 1. Aluminum pipe and tube handrails and railing systems.
 - 2. Stainless steel pipe and tube handrails and railing systems.

1.3 QUALITY ASSURANCE

- A. **Single-Source Responsibility.** Obtain handrails and railing systems of each type and material from a single manufacturer.
- B. **Engineering Responsibility.** Engineer handrails and railing systems by professional engineer legally authorized to practice in jurisdiction where project is located.

1.4 SUBMITTALS

- A. **Submit the following** in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.
- B. **Submittal Package No. 1 – Product Data and Shop Drawings**
 - 1. Product data for each type of product specified.
 - 2. Shop drawings showing fabrication and installation of handrails and railings including plans, elevations, sections, details of components, and attachments to other units of work.
 - a. Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation.
 - 3. Product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of railing

components and systems with requirements based on comprehensive testing of current products.

4. Test reports from independent testing laboratory evidencing compliance of handrails and railing systems with ASTM E 985.
5. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Engineer/Architects and Owners, plus other information specified.

1.5 JOB CONDITIONS

A. Field Measurements

1. Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings.
2. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with fabrication of products without field measurements.
3. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 01 60 00 "Materials and Equipment."**

1.7 SPECIAL WARRANTY

Not used.

1.8 DEFINITIONS

- A. Definitions in American Society for Testing and Materials (ASTM) E 985 for railing related terms apply to this section.**

1.9 SYSTEM PERFORMANCE REQUIREMENTS

- A. General.** In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. For Stainless Steel. American Iron and Steel Institute (AISI) "Stainless Steel Cold-Formed Structural Design Manual."
2. For Aluminum. Aluminum Association (AA) "Specifications for Aluminum Structures."

- B. Structural Performance of Handrails and Railing Systems.** Design, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railing systems, anchors, and connections. Apply each

load to produce the maximum stress in each of the respective components comprising handrails and railing systems.

1. Top Rail of Guardrail Systems. Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 pounds applied at any point and in any direction.
 - b. Uniform load of 50 pounds per foot applied horizontally at the required guardrail height and a simultaneous uniform load of 100 pounds per foot applied vertically downward at the top of the guardrail.
 - c. Concentrated load need not be assumed to act concurrently with uniform loads.

 2. Handrails Not Serving as Top Rails. Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 pounds applied at any point and in any direction.
 - b. Uniform load of 50 pounds per foot applied in any direction.
 - c. Concentrated and uniform loads need not be assumed to act concurrently.

 3. Infill Area of Guardrail Systems. Capable of withstanding a horizontal concentrated load of 200 pounds applied to 1 square foot (sf) at any point in the system including panels, intermediate rails, balusters, or other elements composing the infill area. Concentrated load need not be assumed to act concurrently with loads on top rails of railing systems in determining stress on guard.
- C. **Control of Corrosion.** Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
- D. **Thermal Movements.** Allow for thermal movement resulting from the following maximum change (range) in ambient temperature of 120 degrees F in the design, fabrication, and installation of handrails and railings to prevent buckling, opening of joints, overstressing of components, connections and other detrimental effects. Base design calculation on actual material surface temperature range of 180 degrees F due to both solar heat gain and nighttime sky heat loss.

PART 2 - PRODUCTS

2.1 **MANUFACTURERS**

- A. **Subject to compliance with requirements**, manufacturers offering handrails and railing systems that may be incorporated in the work include but are not limited to the following:

B. **Aluminum Pipe and Tube Railing Systems**

1. Blum. Julius Blum & Co., Inc.
2. Braun. J.G. Braun Co.
3. CraneVeyor Corp.
4. Moultrie Manufacturing Co.
5. Newman Bros., Inc.
6. Sterling Factories, Inc.
7. Superior Aluminum Products, Inc.
8. Wagner. R & B Wagner, Inc.

C. **Stainless Steel Pipe and Tube Railing Systems**

1. Blum. Julius Blum & Co., Inc.
2. CraneVeyor Corp.
3. KDI Paragon, Inc.
4. Wagner. R & B Wagner, Inc.

D. **Steel Pipe and Tube Railing Systems**

1. Humane Equipment Co.
2. Wagner. R & B Wagner, Inc.

2.2 **METALS**

A. **General.** Provide metal forms and types that comply with requirements of referenced standards and that are free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. **Aluminum.** Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required:

1. Extruded Bar and Tube. ASTM B 221, alloy 6063T5/T52.
2. Extruded Structural Pipe and Tube. ASTM B 429, 6063-T5/T52.
3. Drawn Seamless Tube. ASTM B 210, 6063-T832.
4. Plate and Sheet. ASTM B 209, 6061-T6.
5. Die and Hand Forgings. ASTM B 247, 6061-T6.
6. Castings. ASTM B 26, A356-T6.

C. **Stainless Steel.** Austenitic stainless steel grade and type designated below for each form required:

1. Tubing. ASTM A 554, Grade MT 304.
2. Pipe. ASTM A 312, Grade TP 304.
3. Castings. ASTM A 743, Grade CF 8 or CF 20.
4. Plate. ASTM A 167, Type 304.

- D. **Steel Plates, Shapes, and Bars.** ASTM A 36.
- E. **Gray Iron Castings.** ASTM A 48, Class 30.
- F. **Malleable Iron Castings.** ASTM A 47, Grade 32510.
- G. **Brackets, Flanges, and Anchors.** Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

2.3 **PAINT**

- A. **Bituminous Paint.** Cold-applied asphalt mastic complying with SSPC Paint 12 except containing no asbestos fibers.
- B. **Zinc-Chromate Primer.** FS TT-P-645.

2.4 **WELDING MATERIALS, FASTENERS, AND ANCHORS**

- A. **Welding Electrodes and Filler Metal.** Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. **Fasteners for Anchoring Railings to Other Construction.** Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.
 - 1. For aluminum railings, provide fasteners fabricated from Type 304 stainless steel.
 - 2. For stainless steel railings, provide fasteners fabricated from Type 304 stainless steel.
- C. **Fasteners for Interconnecting Railing Components**
 - 1. Use fasteners of same basic metal as the fastened metal, unless otherwise indicated.
 - 2. Do not use metals that are corrosive or incompatible with materials joined.
 - 3. Provide concealed fasteners for interconnection of handrail and railing components and for their attachment to other work, except where otherwise indicated.
 - 4. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. **Cast-in-Place and Post-Installed Anchors in Concrete.** Anchors of type indicated below, fabricated from corrosion resistant materials with capability to sustain, without failure, load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing laboratory.
 - 1. Cast-in-place anchors.
 - 2. Chemical anchors.

2.5 **FABRICATION**

- A. **General.** Fabricate handrails and railing systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than those required to support structural loads.
- B. **Railing Systems**
1. Preassemble railing systems in shop to greatest extent possible to minimize field splicing and assembly.
 2. Disassemble units only as necessary for shipping and handling limitations.
 3. Clearly mark units for reassembly and coordinated installation.
 4. Use connections that maintain structural value of joined pieces.
 5. Clearly mark units for reassembly and coordinated installation.
- C. **Form changes in direction** of railing members as follows:
1. By insertion of prefabricated elbow fittings.
 2. By radius bends of radius indicated.
 3. By mitering at elbow bends.
 4. By bending.
 5. By any method indicated above, applicable to change of direction involved.
- D. **Form simple and compound curves** by bending pipe in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
- E. **Welded Connections.** Fabricate railing systems and handrails for connection of members by welding. For connections made during fabrication, 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 tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
 5. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- F. **Nonwelded Connections**
1. Fabricate railing systems and handrails for connection of members by means of railing manufacturer's standard concealed mechanical fasteners and fittings unless otherwise indicated.

LLMWWTP IMPROVEMENTS

2. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 3. Fabricate splice joints for field connection using epoxy structural adhesive where this represents manufacturer's standard splicing method.
- G. **Welded Connections for Aluminum Pipe.** Fabricate pipe handrails and railing systems for connection of members by concealed internal welds, which eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- H. **Brackets, Flanges, Fittings, and Anchors.** Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors for interconnection of handrail and railing members to other construction.
- I. **Provide inserts and other anchorage devices** for connecting handrails and railing systems to concrete or masonry work.
1. Fabricate anchorage devices capable of withstanding loadings imposed by handrails and railing systems.
 2. Coordinate anchorage devices with supporting structure.
- J. **For removable railing posts,** fabricate slip fit sockets from steel pipe whose inside diameter is sized for a close fit with posts and to limit deflection of post without lateral load, measured at top, to not more than 1/12 of post height.
1. Provide socket covers designed and fabricated to resist accidental dislodgement.
 2. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated.
 3. Fabricate from same metal as railings.
- K. **Shear and punch metals** cleanly and accurately. Remove burrs from exposed cut edges.
- L. **Ease exposed edges to a radius** of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- M. **Cut, reinforce, drill, and tap miscellaneous metal work** as indicated to receive finish hardware, screws, and similar items.
- N. **For handrails and railing systems** that are exposed to exterior or to moisture from condensation or other sources, provide weepholes or other means for evacuation of entrapped water in hollow sections of railing members.
- O. **Fabricate joints that will be exposed** to weather in a manner to exclude water.
- P. **Provide wall returns at ends** of wall-mounted handrails, unless otherwise indicated.

- Q. **Toe Boards.** Where indicated, provide toe boards at railings around openings and at the edge of open-sided floors and platforms. Fabricate to dimensions and details indicated for connection to, and centered between, each railing post.
- R. **Fillers.** Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.6 **FINISHES, GENERAL**

- A. **Comply with National Association of Architectural Metals Manufacturers (NAAMM) "Metal Finishes Manual"** for recommendations relative to application and designations of finishes.
- B. **Protect mechanical finishes** on exposed surfaces from damage by application of strippable, temporary protective covering prior to shipment.
- C. **Appearance of Finished Work**
 - 1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved samples.
 - 2. Noticeable variations in the same piece are not acceptable.
 - 3. Variations in appearance of other components are acceptable if they are within range of approved samples and they are assembled or installed to minimize contrast.

2.7 **ALUMINUM FINISHES**

- A. **Finish designations prefixed by "AA"** conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. **Class I Clear Anodized Finish.** AA-M12C22A41; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil complying with AAMA 607.1.

2.8 **STAINLESS STEEL FINISHES**

- A. **Remove or blend tool** and die marks and stretch lines into finish.
- B. **Grind and polish surfaces** to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. **180-Grit Polished Finish.** Oil ground, uniform 180-grit textured finish.
- D. **320-Grit Polished Finish.** Oil ground, smooth uniform 320-grit finish.
- E. **Bright, Directional Polish.** AISI No. 4 finish.
- F. **When polishing is completed,** passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. **Coordinate setting drawings, diagrams, templates, instructions, and directions** for installation of anchorages, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete as masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION, GENERAL

- A. **Fit exposed connections accurately together** to form tight, hairline joints.

B. Cutting, Fitting, and Placement

1. Perform cutting, drilling, and fitting required for installation of handrails and railings.
2. Set handrails and railings accurately in location, alignment, and elevation, measured from established lines and levels and free from rack.
3. Do not weld, cut, or abrade surfaces of handrails and railing components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.
4. Set posts plumb within a tolerance of 1/4 inch in 12 feet.
5. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

- 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 that no roughness shows after finishing and contour of welded surface matches those adjacent.

- D. **Corrosion Protection.** Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint or zinc chromate primer.

- E. **Fastening to In-Place Construction.** Provide anchorage devices and fasteners where necessary for securing handrails and railings to in-place construction.

3.3 ANCHORING POSTS

- A. **Adjust handrails and railing systems prior** to anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated but not less than that required by design loadings.

- B. **Cover anchorage joint** with a round steel flange welded to post after placement of anchoring material.
- C. **Leave anchorage joint exposed**, wipe off surplus anchoring material, and leave 1/8 inch buildup, sloped away from post. For installations exposed on exterior or to flow of water, seal anchoring material to comply with grout manufacturer's directions.
- D. **Anchor posts to metal surfaces** with oval flanges, angle type or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For stainless steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
 - 2. For aluminum pipe railings, attach posts as indicated using manufacturer's standard fittings designed and engineered for this purpose.

3.4 **RAILING CONNECTIONS**

- A. **Nonwelded Connections**
 - 1. Use manufacturer's standard mechanical or adhesive joints for permanently connecting railing components.
 - 2. Use wood blocks and padding to prevent damage to railing members and fittings.
 - 3. Seal recessed holes of exposed locking screws with plastic filler cement colored to match finish of handrails and railing systems.
- B. **Welded Connections.** Use fully welded joints for permanently connecting railing components by welding. Cope or butt components to provide 100 percent contact or use manufacturer's standard fittings designed for this purpose.
- C. **Expansion Joints.** Install expansion joints at locations indicated but not further apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of post.

3.5 **ANCHORING RAIL ENDS**

- A. **Anchor rail ends into concrete** and masonry with round flanges connected to rail ends and anchored into wall construction with post installed anchors and bolts.
- B. **Anchor rail ends to metal surfaces** with oval or round flanges.
 - 1. Weld flanges to rail ends.
 - 2. Connect flanges to rail ends using nonwelded connections.
 - 3. Bolt flanges to metal surfaces.
- C. **Install removable railing sections** where indicated in slip fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

3.6 ATTACHMENT OF HANDRAILS TO WALLS

- A. **Attach handrails to wall** with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface.
- B. **Locate brackets as indicated** or, if not indicated, at spacing required to support structural loads.
- C. **Secure wall brackets** and wall return fittings to building construction as follows:
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Use type of bracket with predrilled hole for exposed bolt anchorage.
 - 3. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 - 4. For hollow masonry anchorage, use toggle bolts with square heads.
 - 5. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.
 - 6. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.
- D. **Mount handrails** only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

3.7 ADJUSTING AND CLEANING

- A. **Touch-Up Painting.** Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.
- B. **Clean** aluminum and stainless steel by washing thoroughly with clean water and soap, following by rinsing with clean water.

3.8 PROTECTION

- A. **Protect finishes of railing systems** and handrails from damage during construction period by use of temporary protective coverings approved by railing manufacturer. Remove protective covering at time of Substantial Completion.
- B. **Restore finishes damaged** during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENT

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** This section includes surface preparation, painting, and finishing of exposed interior and exterior surfaces. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.
- B. **Definitions.** "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.3 QUALITY ASSURANCE

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

1.4 SUBMITTALS

A. General

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

B. Submittal Package No. 1 – Product Data

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

C. Submittal Package No. 2 – Color Charts

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

1.5 JOB CONDITIONS

A. Environmental Conditions

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

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

B. Warning Signs

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

B. Storage

1. Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 degrees F.
2. Keep storage area in a clean condition, free of foreign materials and residue.
3. Store clean rags in a metal container with a tight-fitting cover.
4. Remove oily rags and waste daily.

C. Handling. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Use products of the manufacturers listed in the painting schedule. For "Or Equals", submit complete documentation demonstrating proposed system meets or exceeds specified system. Submit any potential substitutes according to Section 00 70 00 "Standard General Conditions."

2.2 PIPE BANDING TAPE, LABELING, AND DIRECTIONAL ARROWS

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

| | |
|--------------------|-------------|
| Under 3/4 inch | Arrows only |
| 3/4 to 1-1/4 inch | 1/2 inch |
| 1-1/2 to 2 inch | 3/4 inch |
| 2-1/2 to 6 inch | 1-1/4 inch |
| 8 to 10 inch | 2-1/2 inch |
| 10 inches and over | 3-1/2 inch |

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

2.3 THINNERS

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

2.4 COLORS

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

2.5 POTABLE WATER CONTACT

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Compliance

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

3.2 PREPARATION

A. General Procedures

1. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items in place that are not to be painted, or protect them before surface preparation and painting.
2. Remove these items if necessary for complete painting of the items and adjacent surfaces.
3. Following completion of painting operations in each space or area, reinstall items by workers skilled in the trades involved.
4. All surfaces must be clean, dry, and free of oil, grease, chalk, and other containments.
5. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet paint.

B. Surface Preparation. Clean and prepare surfaces to be painted in accordance with the manufacturer's instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials. Prepare concrete, concrete masonry block, cement plaster, and mineral fiber reinforced cement panel surfaces to be painted.
 - a. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents.
 - b. Roughen as required to remove glaze.
 - c. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - d. Use abrasive blast cleaning methods according to SSPC-SP13/NACE 6, ICRI CSP 2-3 to prepare concrete unless an alternate method is approved.

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

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

3.3 APPLICATION

A. **Requirements**

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

B. **Special Techniques/Requirements**

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

3.4 MARKING

- A. **Color Coding.** Paint and mark according to function all exposed piping as specified in Part 4 of this section, and as required by 30 TAC 217.329.
- B. **Banding.** Band all exposed piping as specified in Part 4 of this section. Space banding as directed, but not greater than 10 feet apart with a minimum of one group of bands between fittings.
- C. **Flow Arrows.** Provide arrows indicating flow direction on all exposed piping.
- D. **Labeling.** Label all exposed piping with the function of the pipe. Apply labeling on any single run of pipe before any tees or elbows, but not greater than 20 feet on center.

3.5 FIELD QUALITY CONTROL

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

3.6 PROTECTION

- A. **Cover.** Protect work of other trades, whether to be painted or not, against damage by painting. Correct damage in an acceptable manner by cleaning, repairing or replacing, and repainting.

B. Signs

1. Provide "wet paint" signs to protect newly painted finishes.
2. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.
3. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
4. Remove all "Wet Paint" signs and other warning signs utilized during installation and curing.

3.7 DEMONSTRATION

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

PART 4 - SCHEDULE

4.1 GENERAL

- A. **Dry Film Thickness Per Coat.** DFT is the acronym for this term in the following schedules. Do not exceed the manufacturer's recommended maximum dry film thickness per coat.
- B. **New Work.** Paint all new surfaces according to paragraph 4.2.
- C. **Existing Areas**
1. **Compatibility Test.** Before painting, patch test all areas for compatibility of new paint with existing and notify the Engineer/Architect of any incompatibility.
 2. **Adhesion Test.** Before painting, perform the tests per ASTM D 3359, Methods A and/or B, followed by a report detailing the system tested, their results, and any recommended changes to the specified system.
 3. **Disturbed Areas.**
 - a. Paint all surfaces of existing areas disturbed due to tie-ins, closing of openings, cutting new openings, rerouting of pipe, relocating or removal of equipment, and other related work as specified herein.
 - b. Color match existing surface and paint to lap existing by not less than 3 inches.

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D. **Coding and Banding.** When exposed, color code and band the following piping, fittings, and valves with the specified colors:

| Material | Tnemec | PPG | Carboline | International | ICI/Devoe |
|--|--|--|---|--|--|
| Water Raw Settled Filtered Softened Finished or Potable Backwash Supply Nonpotable | Spring Water Aqua Sky Delft Blue Clear Sky Safety Blue Purple Haze Safety Purple | Fiberoptics Water Garden Cavern Ice Cooling Tower Safety Blue Cyprus Blue Safety Purple | Blue Ice Skyward Open Sky Atomic Blue Safety Blue National Blue Safety Purple | Light Blue Mint Green Sky Blue Mid-Ocean Blue Safety Blue Blue Safety Purple | Seafoam Breeze Cascading Water Car Blue Light Blue Safety Blue National Blue Safety Purple |
| Wastewater Raw Primary Secondary Filtered Effluent Backwash Waste/ Supernatant Filter to Waste/Drain | Deep Space Gray Light Gray Slate Gray White Aluminum Black | Dark Gray Light Gray ASA No. 70 Mountain Mist Porcelain White Conveyor Gray Black Gold | Machine Gray Gull Gray Light Gray Sterling Gray Safety White Granite Gray Black | Aluminum Gray Light Gray Gray Platinum Gray Blued White Steel Gray Black | Machine Gray Haze Gray Light Gray Mist Gray White on White Swordplay Black |
| Sludge Primary WAS RAS Digested Thickened | Clay Muley Amber Canyon Tiki Wood Weathered Bark | Weathered Marble Desert Brown Beechnut Tantone Telegraph | Basket Weave Blush Alpaca Dunes Tan Falcon Brown | Dark Ivory Beige Medium Brown Cream Tan Brown Medium Brown Bark | Water Chestnut Clay Pot Tuscan Tan Sand Motif Warm Brown |
| Flammable/Explosive Natural and Propane Gas Liquid Fuel Oil/Diesel Methane/Digester Gas Odor Control Foul Air | Safety Red Chilean Red Safety Orange International Orange | Safety Red Caution Red Safety Orange Caution Orange | Safety Red Tile Red Safety Orange Coppers Smith | Safety Red Red Safety Orange International Orange | Safety Red Oxide Red Safety Orange Kessy's Bark |
| Air Low Pressure (≤ 90 psi) High Pressure (> 90 psi) | Hunter Green Safety Green | Caution Green Safety Green | Vernal Green Safety Green | Signal Green Safety Green | Medium Green Safety Green |

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| Material | All Manufacturers |
|--|---------------------------------|
| Storm | Match ceilings and walls. |
| Electrical Conduit | Match ceilings and walls. |
| Chemicals | |
| Chlorine/Sodium Hypochlorite | Safety Yellow with no bands |
| Oxidants (Ozone, Permanganates, Ammonia) | Safety Yellow with purple bands |
| Phosphates | Safety Yellow with brown bands |
| Coagulants (Alum, Ferric Chloride, Polymers) | Safety Yellow with orange bands |
| Carbon Slurry | Safety Yellow with black bands |
| Bases (Lime Slurry, Caustic, Soda Ash) | Safety Yellow with green bands |
| Fluoride | Safety Yellow with blue bands. |
| Acids (Sulfuric, etc.) | Safety Yellow with red bands |
| Sodium Bisulfite | Safety Yellow with white bands |
| Brine | Safety Yellow with gray bands |

4.2 PAINT SCHEDULE

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

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

4.3 MANUFACTURERS AND PAINT CODES

| Generic Name | Code | Tnemec | PPG | Carboline | ICI/Devoe | International |
|---|------|---|------------------------------|--------------------|--------------------------------|-------------------------------|
| Cementitious Acrylic or Polyamide Epoxy Block Filler | A | Series 130-6602 Envirofill | Aquapon 97-685 Series | Sanitile 600 | Bloxfill 4000 Block Filler | Intercryl 320 |
| Polyamide Epoxy | B | Series N69-H.B. Epoxoline II | Aquapon HB 97-130 | Carboguard 893 SG | Devran 224 HS | Intergard 251 |
| Polyamide Epoxy NSF 61 Approved | C | Series N140 Pota-Pox Plus | Aquapon 95-132 | Carboguard 561 | Bar-Rust 233H | Interseal 670HS |
| Coal Tar Epoxy/Ultra High Build Epoxy | D | Series 46H-413 Black HB Tneme-Tar | Coal Cat 97-650 | Bitumastic 300M | Devtar 5A | Interzone 954 |
| Self-Leveling/ Polyamide Epoxy | E | Series 281 Tneme-Glaze | Megaseal SL 99-6680 | Sanitile 945 | DevFloor 525 with DevFloor 571 | Intergard 345 |
| Filler and Surfacer | F | Series 218 MortarClad | Megaseal CF 99-6672 or -6675 | Sanitile 600 TG | DevFloor 574 / Bloxfill 4000 | Ceilmote 610 / Corocrete SF |
| Polyurethane | G | Series 1074 H.B. Endura-Shield II | Pitthane Ultra 95-812 | Carbothane 134 HG | Devthane 379 | Interthane 870 |
| Novolac Epoxy (including Raven 400 Series) | H | Series 282 Tneme-Glaze | Megaseal SC/HSN | Semstone 145 | Devran 124 | Ceilmote 2000 w/ Ceilmote 680 |
| Not Used | I | | | | | |
| High Temperature Primer | J | Series 90E-92 Tneme-Zinc | Silicone-Acrylic Red | Carbozinc 11 | HT-8 | Interzinc 22 |
| High Temperature Silicone (Resists at least 450 degrees F) | K | Series 39 | Speedhide 6-230 | Thermaline 4900 R | HT-8 | Intertherm 875 |
| Very High Temperature Silicone (resists at least 1000 degrees F and requires a bake cure) | L | Series 39 | Speedhide 6-220 | Thermaline 4700 | HT-10 Aluminum | Intertherm 50 Aluminum |
| Elastomeric Acrylic | M | Series 156/157 Envirocrete | Permacrete 4-110 | Flexside Elastomer | #2200 Decra-Flex Elastomeric | N/A |
| Acrylic Primer | N | Series 10-10-99W | Seal Grip 17-921 | Carbocrylic 120 | Devflex 4020 | Intercryl 520 |
| Acrylic | O | Series 6 Tneme-Cryl | Pitt Tech 90-474 | Carbocrylic 3359 | Devflex 4208 | Intercryl 530 |
| Cold Galvanizing Compound | P | Minimum 95% Zinc. Approved Manufacturers: Rust-Oleum, ZRC, or Chesterton 752. | | | | |
| High-Build Epoxy Floor Coating | Q | Armorclad ARM707X topcoat with Armorpoxy ARM015X or ARM143/144X primer. | | | | |

END OF SECTION

SECTION 13 00 50

FIBERGLASS WEIRS AND BAFFLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide all labor, tools, equipment, and materials necessary to furnish and install, in proper operating conditions, the fiberglass weirs and scum baffles for the two secondary clarifiers, as shown on the drawings.
- B. **The Contractor** shall furnish the manufacturer's services as specified in Division 1 and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes.** Perform all work in compliance with all federal, state, and local codes.
- B. **Standards.** Materials and workmanship shall be in accordance with the following standards:
 - 1. ANSI - American National Standards Institute.
 - 2. ASTM - American Society for Testing Materials.
- C. **Regulatory Agencies.** Perform all work in compliance with the requirements of the following regulatory agencies:
 - 1. OSHA - Occupational Safety and Health Administration.
- D. **Manufacturer.** The fiberglass weirs and baffles shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished. All equipment and items specified herein shall be obtained from a single manufacturer who shall be solely responsible for the design of the entire unit. The manufacturer of the unit shall have a minimum of three years installation experience and a minimum of 5 units in operation. The equipment shall be NEFCO, Inc., Palm Beach Gardens, Florida; MFG Construction and Water Products, Union City, Pennsylvania, or Enduro Composites, Houston, Texas.

1.4 SUBMITTALS

- A. **Product Data.** Submit manufacturer's product data in accordance with Section 01 33 00 "Submittals," of the equipment and all appurtenances and accessories.
- B. **Installation List.** Provide installation list of at least five installations with names and phone numbers of similar equipment installed and operating.
- C. **Shop Drawings.** Shop drawings shall be submitted to the Engineer/Architect for review. Shop drawings shall be in accordance with Section 01 33 00 "Submittals" and shall show dimensional layouts and clearances, anchor bolts, sectional and plan views of fiberglass weirs and baffles construction, complete assembly drawing, type of material, dimensions and thicknesses of each element, weights, installation and operation instructions, bill of materials, and warranty.
- D. **Test Samples.** Submit test samples of every component specified and one each of every type of hardware and anchor bolts.
- E. **Storage Requirements.** Submit storage requirements as specified in Section 01 60 00 "Materials and Equipment."

1.5 JOB CONDITIONS

- A. **Coordination.**
 - 1. **Interfacing.** Coordinate with all other trades to prevent delays, errors, or omissions.
 - 2. Coordinate work, dimensions and shop drawings with that specified on the drawings and at Section 44 32 30.
- B. **Environment Requirements**
 - 1. **Climatic Conditions.** The fiberglass weirs and baffles shall be designed for operation in an outdoor installation with exposure to sunlight, locally variable climatic conditions, including temperature and weather conditions.
 - 2. The fiberglass weirs and baffles shall be specifically designed not to degrade in exposure to direct sunlight.

1.6 DELIVERY, STORAGE AND HANDLING

- A. **General.** The delivery, storage, and handling of the fiberglass density current baffles shall be in accordance with Section 01 60 00 "Materials and Equipment," and the manufacturer's instructions.

PART 2 - PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. **Scope of Equipment.** The fiberglass weirs and baffles shall consist of weir and baffle panels, neoprene gaskets, integral brackets and mounting hardware, which

shall be specifically designed to attach to the concrete walls of the clarifiers, as shown on the drawings. The weirs and baffles for the clarifiers shall be designed to follow the curvature of the clarifier tanks.

- B. **Mounting.** The weir panels shall be rigidly attached to the concrete walls and caulked so that no water leakage occurs between the weir plates and the walls. The panels shall also be rigidly attached to the concrete walls with fiberglass support brackets and Type 316 stainless steel hardware. The design shall form a rigid structure capable of supporting its own weight and other forces exerted on it, whether the tank is full or empty.

2.2 MATERIAL

- A. **All weir plates,** scum baffle plates, lap plates, cover plates and scum baffle support brackets shall be fiberglass reinforced polyester resin, matched-die molded to produce smooth, resin rich surfaces, free of voids, porosity, exposed glass, cracks or crazes. All edges shall be sealed in the mold. Weir plates and scum baffle plates fabricated from plate stock with cut edges and notches will not be allowed.
- B. **Laminate** shall have Type "C" (chemical) glass surfacing mat, 10 to 20 mils thick, with a silane finish and a styrene soluble binder, on both sides. Required thickness shall be achieved using the appropriate number of plies of Type "E" (electrical borosilicate) glass mat with chrome or silane finish and a styrene soluble binder. Glass content of laminate shall be 28.5 ± 3.5 percent by weight. Resin fillers shall be 40 ± 2 percent of the resin mixture. Final laminate thickness shall be within ± 10 percent of the nominal specified thickness.
- C. **Physical Properties.** The physical properties of the laminate shall meet or exceed those listed below.

| Laminate Properties | Value | Test Method |
|--|--|-------------|
| Tensile Strength | 14,000 psi | ASTM D 638 |
| Flexural Strength | 25,000 psi | ASTM D 790 |
| Flexural Modulus | 1.0×10^6 psi | ASTM D 790 |
| Barcol Hardness | 40 | ASTM D 2583 |
| IZOD Impact | 15 ft-lb/in. | ASTM D 256 |
| Water absorption, % 24 hours | 0.2 percent | ASTM D570 |
| Average coefficient of thermal expansion | 10.5×10^{-6} inch per inch per degree F | ASTM D696 |

- D. **Resin** with sufficient thixotropic agent added to form a suitable resin seal mix shall be used to seal any machined edges.

2.3 DESIGN

- A. **Weir Plates.** Weir plates shall be 1/4 inch nominal thickness and color shall be aqua or green. Weir sections shall be from 4 feet 0 inches to 5 feet 6 inches long of dimensions and design as shown on the plans. Five inch diameter fiberglass cover washers shall prevent short circuiting at anchor bolt locations. Ends of

weir plates shall be secured with 6 inch wide lap plates to allow for horizontal expansion.

- B. **Scum Baffle.** Scum baffle plates shall be 1/4 inch nominal thickness and color shall be aqua or green and match weir plate color. Baffle plates shall be provided with mounting holes as required to attach to support brackets. Scum baffle panels shall be 12 inches high. Lengths shall be made to suit the tank but lengths shall not exceed 10 feet. Lap plates shall be 6 inches wide height to match joining plates and shall secure the ends of the baffle plates. Stainless steel hardware shall secure baffle plates to support brackets and to lap plates.
- C. **Scum Baffle Support Plates.** Scum baffle support brackets shall be made from fiberglass reinforced polyester resin. They shall be provided and installed at least every 48". Brackets shall be at least 3/16 inch thick, a minimum of 4 inches wide and shall be slotted to allow for at least 1-1/2 inch vertical and horizontal adjustment to compensate for any inaccurate anchor bolt location.
- D. **Anchorage and Fastening**
 - 1. All of the fasteners required for installation shall be supplied by the fiberglass weir and baffle manufacturer. All fasteners shall be Type 304 or Type 316 stainless steel.
 - 2. Hardware shall be 1/2 inch nuts, bolts, washers, and any other necessary devices supplied by the manufacturer.
 - 3. Anchor bolts shall be Type 316 stainless steel, 1/2 inch by minimum 3-3/4 inch.

2.4 SOURCE QUALITY CONTROL

- A. **Manufacturer** shall maintain a continuous quality control program and shall furnish to the Engineer certified results of the physical tests listed herein.
- B. **Provide certified tests** according to the appropriate (and previously specified) ASTM test method for tensile strength, flexural modulus and strength, notched Izod impact, Barcol hardness, water absorption and coefficient of thermal expansion on identical product manufactured at facility the baffles and weirs are being manufactured.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Coordination.** Coordinate shop drawings from Section 44 32 30 "Secondary Clarifiers" and this section for equipment compatibility and non-interference.
- B. **Site Verifications of Conditions.** Verify that surfaces and site conditions are ready to receive work and the following conditions:
 - 1. Verify structure and equipment dimensions.
 - 2. Concrete is clean and ready for equipment to be placed.

- C. **Responsibility.** Beginning the installation means the installer accepts the existing surfaces and conditions.

3.2 **PREPARATION**

- A. **Protection.** Protect adjacent equipment, piping, and valving against damage from the fiberglass weirs and baffles installation where required.
- B. **Manufacturer's Instructions.** Preparatory work in accordance with manufacturer's instructions shall be completed prior to equipment installation.

3.3 **INSTALLATION**

- A. **Requirements.** Fabrication and installation of the fiberglass weirs and baffles shall be as shown on the plans, as specified herein, in accordance with the approved shop drawings and the manufacturer's instructions and recommendations. Mounting holes shall be field drilled. The contractor shall apply gaskets and sealant between the weir and the wall to prevent flow of liquid between the weir and tank wall.
- B. **Leveling.** Weirs and scum baffles shall be carefully aligned and leveled to the elevations shown on the drawings. Installed weirs shall be true and level to within $\pm 1/16$ inch of their design elevation over their entire length. No variation greater than $1/8$ inch shall exist between any two notches of the weir plate in any one clarifier.
- C. **Adjustments.** When it is necessary to adjust lengths of weir plates or scum baffle plates so that they are non-standard, all machined or cut edges, thus exposed shall be sealed with polyester resin.

3.4 **FIELD QUALITY CONTROL**

- A. **Inspection.** It is the Contractor's responsibility to notify and coordinate with the equipment manufacturer in a timely manner in order for them to conduct their required inspection as required in this specification section.
- B. **Manufacturer's Representative.** A qualified representative of the equipment manufacturer shall inspect the completed installation and provide the Owner with a written certificate of approval in accordance with Section 01 33 00 "Submittals."
- C. **Defective Work.** If defects are detected, it will be the responsibility of the Contractor to take corrective procedures.

3.5 **CLEANING AND DISPOSAL**

- A. **Cleaning.** Cleaning shall be in accordance with Section 01 74 23 "Cleaning."
- B. **Disposal.** The Contractor is responsible for the removal from the job site, and as necessary, safe disposal of all excess materials, and debris as result of the work completed under this section, including testing procedures. Disposal shall be in

accordance with Section 01 74 23 "Cleaning."

3.6 **PROTECTION**

- A. **Requirements.** The Contractor shall be responsible for provisions to protect the fiberglass weirs and baffles and associated equipment and materials after installation, but prior to acceptance by the Owner. Protection of the equipment shall include provisions during installation of nearby piping, valving, and other adjacent equipment. The Contractor shall remove all protective measures installed at completion and acceptance of the project.

END OF SECTION

SECTION 13 07 19

PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **General.** The Contractor shall provide the labor, tools, equipment, and material necessary to perform piping insulation work in accordance with the drawings and as specified herein. Note requirement to satisfactorily test all lines and equipment prior to installing insulation materials for that item.
- B. **Types.** Types of piping insulation specified in this section include the following:
 - 1. Foam or Fiberglass Insulation and Aluminum Jacketing. Typical of all exposed plumbing and exterior exposed process piping, as indicated on the drawings.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all insulation work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. **Manufacturer's Qualifications.** Firms regularly engaged in manufacture of piping insulation products, of types and sizes required, whose products have been in satisfactory use in similar services for not less than 3 years.
- C. **Installer's Qualifications.** Firm with at least 5 years successful installation experience on projects with piping insulations similar to that required for this project.
- D. **Flame/Smoke Ratings.** Provide composite piping insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by American Society for Testing and Materials (ASTM) E 84 (National Fire Protection Association [NFPA] 255) method.

1.4 SUBMITTALS

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and material certifications as required.
- B. **Product Data.** Submit manufacturer's technical product data and installation

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instructions for each type of piping insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each system requiring insulation. Provide material data in sufficient detail to enable an item by item comparison with these specifications.

- C. **Maintenance Data.** Submit maintenance data and replacement material lists for each type of piping insulation. Include this data and product data in maintenance manual.
- D. **Layouts.** Provide dimensional layouts and locations.

1.5 JOB CONDITIONS

- A. **General.** Verify job conditions which may impact insulation layouts and dimensions prior to ordering materials. Insulation shall be installed to field measurements unless specifically noted otherwise.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. **Delivery.** Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
- B. **Protection and Damage.** Protect insulation against sunlight, dirt, water, and chemical and piping damage. Do not install damaged or wet insulation; remove wet or damaged insulation from project site.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 - 1. Armacell (Armaflex).
 - 2. Armstrong World Industries, Inc.
 - 3. Babcock and Wilcox; Insulating Products Div.
 - 4. Certainteed Corp.
 - 5. Knauf Fiber Glass GmbH.
 - 6. Johns Manville Products Corp. (Zeston 300 Series PVC)
 - 7. Owens-Corning Fiberglas Corp.
 - 8. Pittsburgh Corning Corp.
 - 9. Rubatex Corp.
 - 10. Engineer/Architect approved equal.

2.2 PIPING INSULATION MATERIALS

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A. **Fiberglass Piping Insulation.** ASTM C 547, Class 1 for use up to 450 degrees Fahrenheit (° F.); Class 2 for use up to 650° F. and Class 3 for use up to 1,200° F.

B. **Elastomeric Insulation**

1. Foam Insulation. Flexible, unicellular, foam insulation with self-sealed end joints. ASTM C534, Type 1.
2. Insulation shall be covered with color coded PVC jacketing.
3. Insulation Material. Flexible, closed-cell elastomeric insulation in sheet form meeting the requirements of ASTM C 534, Grade 1, Type II, specification for pre-formed elastomeric cellular thermal insulation in sheet and tubular form.
4. Materials 1” thickness and below, shall have a flame spread rating of 25 or less and a smoke-developed rating of 50 or less when tested in accordance with ASTM E 84, latest revision. In addition, the product, when tested, shall not melt or drip flaming particles, the flame shall not be progressive, and all materials shall pass simulated end-use fire tests.
5. Thermal Conductivity. Minimum 0.27 Btu-in./h-ft² – °F at a 75°F mean temperature when tested in accordance with ASTM C 177 or ASTM C 518, latest revisions.
6. Water Vapor Transmission. Minimum 0.08 perm-inches when tested in accordance with ASTM E 96, Procedure A, latest revision.
7. Water Absorption Rate. 0.2 percent by volume, maximum.
8. Materials to perform up to 250 °F, per ASTM C 411.
9. Materials to meet NFPA 90A, 90B, and UL 181, Class 1.
10. ASTM C 1071, Erosion Resistance.
11. ASTM G 21 and C1338, Fungi Resistance.
12. ASTM G 22, Bacterial Resistance.
13. ASTM C 665, Non corrosiveness and no objectionable odors.
14. ASTM E162 (fire), ASTM E662 (smoke), and SMP 800C (toxicity).
15. NRC rating 0.30.
16. Dust free and fiber free; non-particulating.

C. **Jackets for Piping Insulation**

1. PVC jacketing.
 - a. ASTM C921, Type I.
 - b. ASTM D 1784.
 - c. Thickness. 30 mil, minimum.
 - d. Color. To be selected from a full range of standard and premium colors; based on piping process function.
 - e. Finish. Gloss.
 - f. Location. As noted on drawings, including all interior process piping, valves, and fittings. Also on equipment where noted.

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2. Aluminum jacketing.
 - a. ASTM B209.
 - b. Thickness. 0.016"
 - c. Seams. 3/4" banding, 0.020" thick.
 - d. Finish. Smooth.
 - e. Location. Encase all exposed exterior piping insulation with aluminum jacket with weather proof construction unless noted otherwise.
- D. **PVC Covers.** Encase pipe fittings insulation with one piece pre-molded polyvinyl chloride (PVC) fitting covers, fastened as per manufacturer's recommendations.
- E. **Staples, Bands, Wires, and Cement.** As recommended by insulation manufacturer for applications indicated.
- F. **Adhesives, Sealers, and Protective Finishes.** As recommended by insulation manufacturer for applications indicated.

2.3 DUCTWORK INSULATION MATERIALS

- A. **Flexible Fiberglass Ductwork Insulation.** ASTM C 553, Type I, Class B-4 (1.5 pounds per cubic foot density).
- B. **Jackets for Ductwork Insulation.** ASTM C 921, Type I for ductwork with temperatures below ambient.
- C. **Ductwork Insulation Accessories.** Provide staples, bands, wires, tape, anchors, corner angles and similar accessories as recommended by insulation manufacturer for applications indicated.
- D. **Ductwork Insulation Compounds.** Provide cements, tapes, adhesives, coatings, sealers, protective finishes and similar compounds as recommended by insulation manufacturer for applications indicated.

2.4 EQUIPMENT INSULATION MATERIALS

- A. **Flexible Fiberglass Equipment Insulation.** ASTM C 553, Type I, Class B-6 (3 pounds per cubic foot density).
- B. **Jacketing Material for Equipment Insulation.** Provide pre-sized glass cloth jacketing material, not less than 7.8 ounces per square yard, or metal jacket at installer's option, except as otherwise indicated.
- C. **Equipment Insulation Compounds.** Provide tapes, adhesives, cements, sealers, mastics and protective finishes as recommended by insulation manufacturer for applications indicated.
- D. **Equipment Insulation Accessories.** Provide staples, bands, wire, wire netting, tape, corner angles, anchors and stud pins as recommended by insulation

manufacturer for applications indicated.

PART 3 - EXECUTION

3.1 GENERAL

- A. **Inspection.** Examine areas and conditions under which insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer.
- B. **Coordination.** Install insulation subsequent to installation of any heat tracing, painting, testing, and acceptance of tests.

3.2 PIPING INSULATION

- A. **Insulation Omitted.** Omit insulation on chrome plated exposed piping (except for handicapped fixtures), air chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers, drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and pre-insulated equipment.
- B. **Cold Piping, Plumbing**
 - 1. Application Requirements. Insulate the following cold plumbing piping systems:
 - a. Potable cold water piping.
 - b. Plumbing vents within 6 lineal feet of roof outlet.
 - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation:
 - a. Fiberglass. 1 inch thickness.
- C. **Hot Piping**
 - 1. Application Requirements. Insulate the following hot plumbing piping systems:
 - a. Potable hot water piping.
 - b. Hot drain piping (where indicated).
 - 2. Insulate each piping system specified above with one of the following types and thicknesses of insulation.
 - a. Fiberglass. 1 inch thick for pipe sizes up to and including 6 inches, 1 1/2 inches thick for pipe sizes over 6 inches.

D. **Process Piping**

1. Application Requirements. Insulate exposed interior process piping, where indicated on the plans, unless noted otherwise, with the following:
 - a. Elastomeric, close cell, foam insulation.
 - b. PVC jacketing.

3.3 **INSTALLATION OF PIPING INSULATION**

- A. **General.** Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.
- B. **Sequence of Work.** Install insulation on pipe systems subsequent to installation of heat tracing, painting, testing, and acceptance of tests.
- C. **Surfaces.** Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full length units of insulation, with a single cut piece to complete run. Do not use cut pieces or scraps abutting each other.
- D. **Joints.** Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure a complete and tight fit over surfaces to be covered.
- E. **Vapor Barrier.** Maintain integrity of vapor barrier jackets on pipe insulation, and protect to prevent puncture or other damage.
- F. **Valves and Fittings.** Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at installer's option) except where specific form or type is indicated.
- G. **Structural Penetrations.** Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.
- H. **Hangers.** Butt pipe insulation against pipe hanger insulation inserts. For hot pipes, apply 3 inches wide vapor barrier tape or band over the butt joints. For cold piping apply wet coat of vapor barrier lap cement on butt joints and seal joints with 3 inches wide vapor barrier tape or band.

3.6 **PROTECTION AND REPLACEMENT**

- A. **Replacement.** Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.
- B. **Protection.** Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION

SECTION 26 00 01

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 01 31 19, "Project Meetings."
 - 2. Section 01 33 00, "Submittals."
 - 3. Section 01 50 00, "Temporary Construction Facilities."
 - 4. Section 01 60 00, "Materials and Equipment."
 - 5. Section 01 79 00, "Start-up, Demonstration, and Training."
 - 6. Section 26 00 02, "Basic Electrical Materials and Methods."

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to implement the following general administrative and procedural requirements in accordance with the plans and as specified herein.
- B. **Extent of Work.** Work under this Contract consists of furnishing, installing, testing, and guaranteeing of complete electrical systems as shown on the drawings and as specified in Division 26. Connect and place all wired equipment in proper working order. Refer to the plans and specifications for work included in this Contract. Some general guidelines to coordinating work between Division 26 and Divisions 40 and 44 are as follows:
 - 1. Division 26 includes all 3-phase power for plant equipment provided under Divisions 40 and 44. The instrumentation and control system as specified in Division 40 wiring and interior raceways is not work of Division 26. Exterior raceways for the instrumentation and control system are part of Division 26 work to the extent shown on the plans. Field wiring for plant equipment is work of Division 26. All Division 26 work for Division 40 and 44 equipment is shown on the plans.
 - 2. No generalities regarding the coordination of work with the work of Divisions other than 40 and 44 can be made. See the plans for the extent of these requirements for Division 26 work.
- C. **Temporary Utilities.** Temporary utilities and connections include the following:
 - 1. Engage the local utility company for temporary electric service.
 - 2. Temporary telephones for the Engineer/Architect's field office.

3. Temporary lighting to provide adequate illumination of work areas and security.
4. Temporary power and connections to maintain existing equipment in operation and to permit operation of new equipment as construction progresses.
5. The monthly construction power cost shall be shared by each Contractor in proportion to use.

1.3 QUALITY ASSURANCE

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

1.4 SUBMITTALS

- A. **General.** Follow the procedures specified in Section 01 33 00, "Submittals," and in addition, prepare and submit a complete submittal list. The submittal list shall include all submittal items covered in the Division 26 specification sections. In addition, the submittal list shall contain dates for all items to be submitted and shall accompany the first submittal. The submittal list shall be coordinated with the construction schedule and shall clearly show such coordination.

B. **Shop Drawings.** Submit shop drawings for review for compliance with the Contract Documents. Shop drawings shall identify the specific equipment and material being supplied; the location on the project where it is to be used; the quantity being supplied; and all accessories, dimensions, descriptions, mounting and connection details, wiring diagrams, elementary control diagrams, equipment interface diagrams, and any other information necessary to determine compliance with the plans and specifications. Typical shop drawing review will require 10 working days following receipt of all information necessary to determine compliance with the plans and specifications. If the submittal schedule or actual submittal contains too large a quantity to allow a 10-day turnaround, the Contractor will be so informed as early as possible. The added number of days required for review will be determined at that time. Fabrication and installation shall be in accordance with the approved shop drawings. Products submitted as substitutions shall be clearly marked as such in the submittal. Please see general and supplemental conditions for further requirements for substitutions.

1. Increase, by the quantity listed below, the number of electrical-related shop drawings, product data, and samples submitted, to allow for distribution plus two copies of each submittal which will be retained by the Engineer/Architect.
 - a. Shop Drawings - Initial Submittal. One additional blue or black line print.
 - b. Shop Drawings - Final Submittal. One additional blue or black line print.
 - c. Product Data. One additional copy of each item.
 - d. Samples. One additional for each item.

Additional copies may be required by individual sections of these specifications.

C. **Permits and Easements.** Submit copies of reports, permits, and easements necessary for installation, use, and operation.

D. **Test Reports.** Submit copies of reports of tests, inspections, and meter readings as specified. Tests, inspections, and meter readings shall be performed using the Contractor's temporary power source unless otherwise specified.

E. **Coordination Drawings**

1. Prepare and submit prior to commencing such work coordination drawings in accordance with Division 1 section "Project Coordination" to a scale of 1/4" = 1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the work, including (but not necessarily limited to) the following:

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- a. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
 - 1) Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
 - 2) Exterior wall and foundation penetrations.
 - 3) Fire rated wall and floor penetrations.
 - 4) Equipment connections and support details.
Demonstrate evidence of dimensional coordination.
 - 5) Sizes and location of concrete pads and bases.
- b. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
- c. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

F. **Operation and Maintenance Manuals**

1. Prepare maintenance manuals in accordance with Section 01 79 00, "Start-up, Demonstration, and Training". Compile and assemble the operation and maintenance data of equipment specified in Division 26 into a separate set of vinyl covered three ring binders, tabulated and indexed for easy reference. Data shall clearly indicate only provided options and accessories.
2. In addition to the requirements specified in Division 1, include the following information for equipment items:
 - a. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - b. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - d. Servicing instructions and lubrication charts and schedules.
 - e. Spare parts list as required by individual Division 26 sections.

1.5 **JOB CONDITIONS**

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

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

1.6 **DELIVERY, STORAGE, AND HANDLING**

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

1.7 **SPECIAL WARRANTY**

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

1.8 **DEFINITIONS**

- A. **Finished Areas.** In general, areas with carpet or tile floors, lay-in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.
- B. **Interior.** For the purposes of this specification, interior is any area within the boundaries of the foundation of any building or within the superstructure of other structures not classified as a building.

- C. **Hazardous (Classified) Areas.** Hazardous (classified) areas are designated on the drawings in conformance with the NEC. All equipment and the installation shall conform to requirements for installation in the designated hazardous area as described in Articles 500, 501, 502, and 504 of the NEC.

1.9 **FAULT CURRENT, COORDINATION, AND SELECTIVITY STUDY**

- A. **General.** Provide three copies of a written, detailed, documented selective power distribution system report showing fault currents available using log-log graphical representation. The report shall be stamped by a Registered Professional Electrical Engineer. Base the report upon data compiled from the actual equipment installed. Submit the report for review for compliance prior to project closeout. As a minimum, include the following in the report.
 - 1. Overall system description and diagrams.
 - 2. System selectivity under fault and other overload conditions.
 - 3. Ground fault system operation and selectivity.
 - 4. Tabularized ratings and settings of protection devices verified by electrical testing to ensure coordination and selectivity.
 - a. Momentary and interrupting ratings.
 - b. Relays and shunt trip devices.
 - c. Fuses.
 - d. Circuit breakers.
 - 5. Calculated fault currents for at least one feeder/branch circuit from each motor control center and between each switchboard, switchgear, and motor control center.
 - 6. Equipment and conductor damage curves.
 - 7. Pick up and time current characteristics.
 - 8. Short circuit data.
 - 9. Detailed description of test procedures.
 - 10. Design calculations.
 - 11. Description of compatibility with the existing system.

PART 2 - PRODUCTS

2.1 **TEMPORARY ELECTRICAL EQUIPMENT**

- A. **General.** Provide new materials and equipment for temporary services and facilities; if acceptable, you may use used materials and equipment that are

undamaged. Provide materials and equipment that are suitable for the intended use.

1. Provide weathertight, grounded temporary electrical distribution system, with ground fault circuit interrupters and ground fault interrupter features of proper types, sizes, electrical ratings, and characteristics to fulfill project requirements. Provide overcurrent protective devices at main distribution panel for power and light circuitry. Provide disconnects for equipment circuits.
2. Provide circuits of proper sizes, characteristics, and ratings for each use indicated. Provide rigid steel conduit to protect wiring on grade, floors, decks, or other areas exposed to possible damage. Provide 20 ampere, four gang receptacle outlets, equipped with ground fault circuit interrupters, reset button and pilot light, spaced so that a 100 foot extension cord can reach each area of work. Use only grounded extension cords; use "hard service" cords where exposed to abrasion and traffic. Provide warning signs at power outlets that are other than 120 volt. Provide outlets of proper National Electrical Manufacturers Association (NEMA) configuration to prevent insertion of 120 volt plugs into higher voltage outlets.
3. Provide general service incandescent lamps of wattage required for adequate illumination. Protect lamps with guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior type fixtures where exposed to weather or moisture. Provide local switching to allow lights to be turned off in patterns to conserve energy.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. **Rough-In**
1. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
 2. Refer to equipment specifications specified elsewhere for rough-in requirements.

B. Coordination

1. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete or supported from or on other structural components, as they are constructed.
2. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service and place each in proper operating order.
3. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring positioning prior to closing in the building and equipment which must be placed in service before further construction can take place.

C. Clearance. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.

3.3 INSTALLATION

A. General. Install systems, materials, and equipment to conform with submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer/Architect before final placement.

1. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
2. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
3. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

B. Temporary Electric. Provide temporary electric. Use qualified tradesman for installation. Locate temporary services and facilities where they will serve the project adequately and result in minimum interference with the work. Connect the service to the local utility company's temporary power source in the manner directed by the utility company officials. Install temporary lighting to fulfill security and protection requirements, without having to operate the entire temporary lighting system. Inspect and test the temporary electric service before placing in use. Arrange for inspections and test and obtain permits for use. Provide temporary electrical connections when first needed to avoid delay in the work. Maintain, expand, and modify temporary connections as needed. Remove temporary electrical service and connections promptly when need has ended, or when replaced by use of a permanent facility. Complete, or if necessary, restore permanent work delayed because of interference with the temporary service or

facility. Repair damaged work, clean exposed surfaces, and replace work which cannot be repaired. At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

3.4 **CUTTING AND PATCHING**

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

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

3.5 **ELECTRICAL DEMOLITION**

A. **Existing Conduit Location**

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

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

1. Remove and store or relocate all existing electrical apparatus as shown on the drawings, as specified herein, or as necessary for the completion of this Contract except where specifically called for to be included under another section of the Contract. Verify existing conditions, dimensions, locations, quantities, etc., associated with the removal and relocation of electrical apparatus. In addition, verify and identify the existing circuits associated with the removal and relocation of electrical apparatus. Failure to review the Contract Documents and verify the existing conditions shall not be sufficient cause to warrant a change in contract after contract award.
2. Where existing electrical equipment, including lighting fixtures, is shown to be removed, remove the existing branch wiring.
 - a. Wiring removal shall extend to the branch disconnect or to the next piece of utilization equipment.
 - b. Where new or existing equipment is to be reinstalled, the wiring shall be temporarily terminated.
3. Where part of the existing equipment on a branch circuit is to be disconnected, the circuit shall be de-energized only long enough to disconnect the equipment and terminate the wiring that is to remain.
4. All equipment and major lengths of wiring retired and removed shall remain the property of the Owner unless shown or directed otherwise and shall be placed in storage on the site by the Contractor where ordered.
5. When pumps, motors, or other apparatus are being removed under other sections of this Contract, all electrical wiring, conduit, boxes, and related equipment shall be completely removed under Division 26.

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6. Removal of all equipment shall include the removal of all accessories incidental to the major units. Where wiring is removed from conduit and boxes, the accessible conduit and boxes shall also be removed.
7. When the Contract is complete, no piece of electrical equipment shall remain installed that is not in service unless otherwise ordered.
8. Where electrical conduit, boxes, or appurtenances are embedded in walls or slabs, and wires, wiring devices, fixtures, or other apparatus is removed from these embedded items, the conduits shall be cut off flush with the surface and plugged with masonry to a smooth surface and the boxes and other appurtenances covered with suitable approved stainless steel cover plates. The cover plates shall have stainless steel fasteners.
9. Electrical equipment or components, supported by materials or equipment being removed under this or other Divisions in this Contract, shall be temporarily supported during the demolition process and then properly and permanently resupported prior to the conclusion of this Contract. All supports shall meet all the applicable requirements of this Division.
10. Any electrical equipment or components damaged during the performance of this Contract shall be replaced or repaired to a "like new" condition in accordance with the requirements of this Division.

3.6 CLEANING

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

3.7 DEMONSTRATION

- A. **General.** Perform a 30-day operational demonstration of the complete electrical system. Do not begin the 30-day operational demonstration until all field tests are completed and all problems and defects encountered during the field test have been corrected.
- B. **System Acceptance.** System acceptance shall not occur until the entire electrical system has performed as a functioning unit continuously for 30 consecutive days. Failure of any component or required feature shall require a restart of the 30-day operational demonstration until 30 consecutive days of continuous operation have been completed.
- C. **Staffing.** Provide the services of qualified service technician for the duration of the 30-day operational demonstration. The service technician shall be on call 24 hours per day, 7 days a week.

END OF SECTION

SECTION 26 00 02

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 02 41 00, "Demolition."
 - 2. Section 26 00 01, "Basic Electrical Requirements."

1.2 DESCRIPTION OF WORK

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

1.3 QUALITY ASSURANCE

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

B. Qualifications

1. Installer Qualifications. Engage an experienced installer (Journeyman or above) for the installation.
2. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel."
 - a. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.4 SUBMITTALS

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

1.5 JOB CONDITIONS

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Miscellaneous Metals and Reinforcing Materials

1. Provide steel plates, shapes, bars, and bar grating conforming to American Society for Testing and Materials (ASTM) A 36.
2. Provide cold formed steel tubing conforming to ASTM A 500.
3. Provide hot rolled steel tubing conforming to ASTM A 501.
4. Provide steel pipe conforming to ASTM A 53, Schedule 40, welded.
5. Provide nonshrink, nonmetallic grout which is premixed, factory packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.

6. Provide fasteners which are zinc-coated, type, grade, and class as required.
7. Provide deformed reinforcing bars conforming to ASTM A 615, Grade 40 or 60, unless otherwise indicated.
8. Provide reinforcing materials with size and placement as shown on the plans.
9. Provide welded wire fabric conforming to ASTM A 185.

B. Miscellaneous Lumber

1. Provide framing materials which are Standard Grade, light framing size lumber of any species. Number 3 Common or Standard Grade boards complying with West Coast Lumber Inspection Bureau (WCLIB) or American Wood Preservers Association (AWPA) rules, or Number 3 boards complying with Southern Pine Inspection Bureau (SPIB) rules. Lumber shall be preservative treated in accordance with AWPA LP-2 and kiln dried to a moisture content of not more than 19 percent.
2. Provide construction panels which are plywood panels; American Plywood Association (APA) C-D PLUGGED INT, with exterior glue; thickness as indicated, or if not indicated, not less than 15/32 inch.

C. Concrete

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 ERECTION

A. Erection of Metal Supports and Anchorage

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1. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
2. Provide field welding which complies with AWS "Structural Welding Code."

B. Erection of Wood Supports and Anchorage

1. Cut, fit, and place wood grounds, nailers, blocking, and anchorage accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
2. Select fastener sizes that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood members.
3. Attach to substrates as required to support applied loads.

3.3 INSTALLATION

A. Concrete. Install concrete in accordance the plans and as specified herein.

1. Strength, Spacing, and Placement of Equipment Housekeeping Pads. Provide a housekeeping pad for all floor mounted equipment unless noted otherwise. Fabricate pad as follows:
 - a. Coordinate size of housekeeping pad with actual equipment provided. Fabricate base 4 inches larger in both directions than the overall dimensions of the supported equipment.
 - b. Form concrete pads with framing lumber with form release compounds. Provide 1-inch chamfer on top edge and corners of pad.
 - c. Install reinforcing bars and place anchor bolts and sleeves to facilitate securing equipment.

END OF SECTION

SECTION 26 05 12

WIRE, CABLES, AND CONNECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

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

1.3 QUALITY ASSURANCE

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

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- a. WC-70 Nonshielded 0-2 kV Cables.
4. Institute of Electrical and Electronics Engineers (IEEE) Compliance. Provide components which comply with the following standards:
 - a. Standard 82 Test Procedure for Impulse Voltage Tests on Insulated Conductors.

1.4 SUBMITTALS

- A. **General.** Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. **Submittals.** Submit the following in accordance with Conditions of Contract and Division 1 specification sections:
 1. Product data for electrical wires, cables, and connectors.
 2. Product data for Megger insulation testing instrument.
 3. Report sheets for Megger testing.

1.5 JOB CONDITIONS

Not used.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Wires and Cables**
 1. Provide electrical wires and cables of manufacturer's standard materials as indicated by published product information designed and constructed as recommended by manufacturer for a complete installation, and for

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application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98 percent at 20 degrees Celsius (° C.) (68 degrees Fahrenheit [° F.]).

2. Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by Installer to comply with project's installation requirements, and NEC and NEMA standards. Select from the following UL types those wires with construction features which fulfill project requirements:
 - a. Provide Type RHW for dry and wet locations, maximum operating temperature 75° C. (167° F.). Insulation, moisture and heat resistant cross linked polyethylene; conductor, annealed copper.
 - b. Provide Type XHHW for dry locations, maximum operating temperature 90° C. (194° F.). Insulation, flame retardant, cross linked polyethylene; conductor, annealed copper.
 - c. Provide Type THW for dry and wet locations; maximum operating temperature 75° C. (167° F.). Insulation, moisture and heat resistant, flame retardant thermoplastic; conductor, annealed copper.
 - d. Provide Type THWN/THHN for dry and wet/damp locations; maximum operating temperature 75° C. (167° F.)/90° C. (194° F.). Insulation flame retardant moisture and heat resistant thermoplastic; conductor annealed copper.

3. Provide color coding for phase identification in accordance with requirements in Section 26 05 53, "Electrical Identification."
 - a. Wiring and identification for emergency systems shall be in compliance with NEC Article 700-9.

4. Conductor stranding shall be as follows:

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

B. Variable-Frequency Drive (VFD) Cables

1. Material. Conductors shall be annealed copper, conforming to American Society for Testing and Materials (ASTM) B 3 and B 8 and have cross-linked polyethylene (XLPE) insulation, meeting the requirements of UL

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Standard 44, suitable for use in wet and dry locations at a conductor temperature not exceeding 90° C. Conductors shall be listed as either RHW-2 or XHHW-2.

2. Conductor insulation thickness shall be at least 0.045 inches for No. 12 and No. 10 AWG conductors and 0.060 inches for No. 8 through No. 2 AWG conductors.
3. Ground conductors shall be cabled with either one full-size insulated conductor or three bare conductors. Where three conductors are used, the sum of the cross sectional areas of the ground conductors shall be equal to, or greater than, that of an equipment ground conductor sized according to NEC Table 250.122 for the overcurrent device as shown on the contract drawings protecting the VFD cable.
4. Conductors shall be provided with either an overall aluminum foil 100 percent shield covered by a tinned copper braid shield or a 5-mil-thick copper tape corrugated and longitudinally applied with a minimum overlap of 15 percent to form a 100 percent shield.
5. The cable shall be provided with an overall polyvinyl chloride (PVC) jacket, UL 1277 listed as Type TC, Tray Cable.

C. Connectors and Terminals

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

2.2 MANUFACTURERS

- A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
- B. **Manufacturers.** Subject to compliance with requirements, provide products by one of the following:

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1. Wire and Cable.
 - a. American Insulated Wire Corp.
 - b. General Cable Co
 - c. The Okonite Co.
 - d. Rome Cable Corp.
 - e. Southwire Company.

2. VFD Cable.
 - a. Belden.
 - b. Tamaqua Cable Products Corp.
 - c. Or equal.

3. Connectors and Terminals for Wires and Cable Conductors.
 - a. AMP.
 - b. Burndy Corporation.
 - c. Grafoplast Wiremarkers, Inc.
 - d. Ideal Industries, Inc.
 - e. 3M Company
 - f. O-Z/Gedney Co.
 - g. Raychem.
 - h. Square D Company.
 - i. Thomas and Betts Corp.

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION

A. Uses Permitted

1. Install UL-Type THW or XHHW wiring in conduit for service entrance, power feeders, motor branch circuits, panelboard feeder circuits, and below grade or exterior control and metering circuits.
2. Install UL-Type THWN/THHN wiring in conduit for branch circuits for lighting, receptacles, and interior control and metering circuits.
3. Install VFD cables between VFDs and motors.

B. **Install electrical cables**, wires, and connectors in compliance with NEC.

C. **Coordinate cable installation** with other work.

D. **Pull conductors simultaneously** where more than one is being installed in same raceway. Use UL listed pulling compound or lubricant, where necessary.

E. **Use pulling means** including, fish tape, cable, rope, and basket weave wire/cable grips which will not damage cables or raceways. Do not use rope hitches for pulling attachment to wire or cable.

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- F. **Install exposed cable** parallel and perpendicular to surfaces or exposed structural members, and follow surface contours, where possible.
- G. **Power conductors shall be** No. 12 AWG minimum. Control conductors may be No. 14 AWG where circuit amperes and the NEC allow and when length does not pose a voltage drop problem.
- H. **Conductors shall be sized** such that voltage drop does not exceed 3 percent for branch circuits or 5 percent for feeder/branch circuit combination.
- I. **Provide adequate length of conductors** within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled in individual circuits. Make terminations so there is no bare conductor at the terminal.
- J. **Install a maximum of three lighting circuits** or three 20-ampere, 120-volt general-use receptacle circuits per conduit. Install all other branch circuits and feeders in separate conduits unless otherwise noted.
- K. **Provide a separate neutral** for every branch circuit.

3.2 CONNECTOR, TERMINAL, AND SPLICE INSTALLATION

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

3.3 FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 26 05 23

COMMUNICATION AND SIGNAL CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 12, "Wires, Cables, and Connectors," for ordinary building wire that may sometimes be used for control or signal circuits.

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish and install communication and signal cables in accordance with the plans and as specified herein.
- B. **Cables and Accessories.** This section includes cables and connectors designed for and used in communication, control, data, and signal circuits including:
 - 1. Twinaxial cable.
 - 2. Shielded twisted pair cable.
 - 3. Unshielded twisted pair cable.
 - 4. Baluns and splitters.
 - 5. Signal cable terminals.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. **Connected Equipment Manufacturer Approval.** Where cables specified in this section are used to provide signal paths for systems specified in other sections of these specifications or for systems furnished under other contracts, obtain review of the cable characteristics and approval for use with the connected system equipment by the connected equipment manufacturers.
- C. **Electrical Component Standard.** Provide work complying with applicable requirements of National Fire Protection Association (NFPA) 70, "National Electrical Code (NEC)," and NFPA 262, "Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces."

- D. **Toxicity.** Comply with applicable codes and regulations regarding toxicity of combustion products of materials used in communication and signal cables.
- E. **National Electrical Manufacturer's Association/Insulated Cable Engineers Association (NEMA/ICEA) Compliance.** Comply with NEMA/ICEA Standard Publication WC 70, "Nonshielded 0-2 kV Cables"; and WC 63.2, "Performance Standard for Coaxial Premise Data Communications Cables".
- F. **American Society for Testing and Materials (ASTM) Compliance.** Comply with applicable requirements of ASTM B 1, B 2, B 3, B 8, B 33, D 2219, and D 2220. Provide copper conductors with conductivity of not less than 98 percent at 20 degrees Celsius (° C.) (68 degrees Fahrenheit [° F.]).
- G. **Underwriters' Laboratories, Inc. (UL) Compliance.** Comply with applicable requirements of UL Standard 83, "Thermoplastic-Insulated Wires and Cables"; and UL 486 A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide products that are UL listed and labeled.
- H. **Electronic Industries Alliance (EIA) Compliance.** Comply with EIA Standards EIA-230, "Color Marking of Thermoplastic Wire," EIA-258, "Semi-Flexible Air Dielectric Coaxial Cables and Connectors, 50 Ohms," and TIA/EIA-568A, "Commercial Building Telecommunications Cabling Standard."
- I. **MIL-SPEC Compliance.** Comply with MIL-C-3093, "Telephone Cable; Inside Distribution Wiring," MIL-C-55021, "Twisted-Pair and Triplet Cables; Hookups General Specifications," MIL-C-17/28, "Radio Frequency Flexible Coaxial Cables, 50 Ohms," and MIL-C-17/29, "Radio Frequency Flexible Coaxial Cables, 75 Ohms."

1.4 **SUBMITTALS**

- A. **General.** Furnish manufacturer's product data, test reports, and material certifications as required.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

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

1.7 **SPECIAL WARRANTY**

Not used.

PART 2- PRODUCTS

2.1 **MATERIALS**

- A. **General.** Provide communication and signal cables of manufacturer's standard materials as indicated by published product information, designed and constructed as recommended by manufacturer, for a complete installation and for applications indicated.

2.2 **SIGNAL CABLES**

- A. **300-Volt Rated Single Pair.** Shielded twisted pair cable, 18 American Wire Gauge (AWG), stranded- (tinned-) copper conductors, polyvinyl chloride (PVC) insulation, aluminum type shield, tinned copper drain wire, ultraviolet (UV) stabilized PVC jacket, 300-volt rated. UL listed as power limited tray cable. 100 percent shield coverage.
- B. **300-Volt Rated Multiple Pair.** Multiple shielded twisted pairs as described above with an overall shield and UV stabilized PVC jacket, 300 volt rated. UL-listed as power limited tray cable.
- C. **600-Volt Rated Single Pair.** Shielded twisted pair cable, 18 AWG, stranded (tinned) copper conductors, PVC insulation, aluminum type shield, tinned copper drain wire, UV stabilized PVC jacket, 600 volt rated. UL listed as tray cable. 100 percent shield coverage. Suitable for direct burial.
- D. **600-Volt Rated Multiple Pair.** Multiple shielded twisted pairs as described above with an overall shield and UV stabilized PVC jacket, 600 volt rated. UL listed as tray cable. Suitable for direct burial.

2.3 **TWIN AXIAL CABLES.** Balanced pair twin axial cable, 125-ohm characteristic impedance, with 16-gauge soft drawn bare copper conductors twisted to form pairs; core insulation, expanded polyethylene; covered with copper shielding tape and with expanded polyester film.

2.4 **TWIN LEAD CABLES.** Bare copper-covered steel, two-conductor parallel, 300-ohm characteristic impedance, polyethylene insulation and web between conductors, cellular polyethylene oval jacket.

2.5 **CONNECTORS AND TERMINALS**

- A. **Baluns and Splitters.** Provide baluns and splitters as recommended by coaxial cable manufacturer for service indicated to meet cable mating and impedance matching requirements.
- B. **Provide terminals** for signal cable as specified in Section 26 05 12, "Wires, Cables, and Connectors."

2.6 MANUFACTURERS

- A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering control/signal cabling products that may be incorporated in the work include but are not limited to the following:
- B. **Manufacturers.** Subject to compliance with requirements, provide products of one of the following:
 - 1. Cables.
 - a. Alpha Communications.
 - b. American Insulated Wire Corp.
 - c. Belden Communication Division.
 - d. Berk-Tek Company.
 - e. General Cable Corporation.
 - f. Mohawk CDT.
 - g. Phelps Dodge Corp.
 - h. Pirelli Cable Corp.
 - 2. Connectors.
 - a. Thomas & Betts Corporation.
 - b. 3M Company.

PART 3 - EXECUTION

- 3.1 **INSPECTION.** Examine areas and conditions under which communication and signal cables are to be installed. Notify Engineer/Architect in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in an acceptable manner.
- 3.2 **COORDINATION.** Coordinate with other work, including wires/cables, boxes, and raceways, as necessary to interface installations of communication and signal cables with other work.
- 3.3 **APPLICATIONS**
 - A. **Use 300-volt rated single- or multiple-pair** signal cables for analog direct current (dc) signals (4-20 milliampere [mA], 1-5 volt, etc.) interior to buildings and in control panels where no circuit voltage exceeds 300 volts.
 - B. **Use 600-volt rated single or multiple pair** signal cables in all exterior or underground conduits, and in all pull boxes, control panels, or motor control centers where circuit voltages exceed 300 volts.
- 3.4 **INSTALLATION**
 - A. **General.** Install communication and signal cables in accordance with manufacturer's written instructions, in compliance with NEC, and in accordance with standard industry practice.

- B. **Coordinate installation** with other work.
- C. **Install communication and signal cables** without damaging conductors, shield, or jacket. Do not, either in handling or installation, bend cable to smaller radii than minimum recommended by manufacturer. Ensure that medium manufacturer's recommended pulling tensions are not exceeded. Pull conductors simultaneously where more than one is being installed in same raceway. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cable or raceway.
- D. **Install all cables** in conduit.
- E. **Install exposed cable** parallel and perpendicular to surfaces or exposed structural members, and follow surface contours where possible.
- F. **Splices are allowed** only at indicated splice points. Where splices are indicated, use splice and tap connectors that are compatible with media material.
- G. **Tighten connectors and terminals**, including screws and bolts, in accordance with manufacturer's published instructions for torque tightening values.
- H. **Cable Terminations.** Terminate cables on numbered terminal blocks where cable terminations are made on backboards and in cabinets and outlet boxes.
- I. **Wiring at Backboards and Cabinets.** Install conductors parallel to and at right angles to walls. Bundle, lace, and train the conductors to terminal points with no excess. Use wire distribution spools at points where cables are fanned or conductors turned. Label each terminal.
- J. **Conductor Terminations.** Terminate conductors of cables on terminal blocks using tools recommended by terminal block manufacturer.

3.5 GROUNDING

- A. **Provide equipment grounding connections** for telephone systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to ensure permanent and effective grounding.

3.6 FIELD QUALITY CONTROL

- A. **Prior to usage, test communication** and signal cables for electrical continuity and for short circuits. In addition, test the cable installation with a time domain reflectometer with strip chart recording capability and anomaly resolution to within 1 foot in runs up to 1,000 feet in length. Test all cable segments for faulty connectors, splices, terminations, and the integrity of the cable and its component parts. Replace malfunctioning cable with new materials, then retest until satisfactory performance is achieved.

3.7 COMMISSIONING

- A. **Subsequent to hookups** of communication and signal cables, operate communication and signal systems to demonstrate proper functioning. Replace malfunctioning cable with new materials, and then retest until satisfactory performance is achieved.
- B. **Documentation.** Use the above time domain reflectometer to make a strip chart recording of transmission characteristics, wave form, and performance of all segments of the installation at the time of commissioning. Bind the recordings in a cable record book indexed for easy reference during future maintenance operations and turn book over to the Owner's authorized representative.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 12, "Wires, Cables, and Connectors."
 - 4. Section 26 05 53, "Electrical Identification."

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish and install grounding materials in accordance with the plans and as specified herein.
- B. **Grounding.** This section includes solid grounding of electrical systems and equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this section may be supplemented in other sections of these specifications.
- C. **Applications of electrical grounding** and bonding work in this section include the following:
 - 1. Underground metal piping.
 - 2. Underground metal water piping.
 - 3. Underground metal and steel reinforced concrete structures.
 - 4. Metal building frames.
 - 5. Grounding plate electrodes.
 - 6. Grounding electrodes.
 - 7. Counterpoise loops.
 - 8. Raceways.
 - 9. Service equipment.
 - 10. Enclosures.
 - 11. Equipment.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to furnish and install grounding in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

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1. Electrical Code Compliance. Comply with applicable local electrical code requirements of the authority having jurisdiction, and American National Standards Institute/National Fire Protection Association (ANSI/NFPA) 70, "National Electrical Code" (NEC), as applicable to electrical grounding and bonding, pertaining to systems, circuits, and equipment. Comply with the latest edition of the codes listed above.
2. Underwriters' Laboratories, Inc. (UL). All grounding system components and materials for which UL maintains a testing and listing service shall be UL listed. Comply with the applicable requirements of the following UL standards:
 - a. 467, "Electrical Grounding and Bonding Equipment."
 - b. 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors."
 - c. 486B, "Wire Connectors for Use with Aluminum Conductors."
 - d. 486C, "Splicing Wire Connectors."
 - e. 869, "Electrical Service Equipment."
3. ANSI/Institute of Electrical and Electronics Engineers (IEEE). Comply with applicable provisions and recommended installation and testing practices of the following ANSI/IEEE standards:
 - a. 80-1986, "IEEE Guide for Safety in AC Substation Grounding."
 - b. 81-1983, "IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounded System (Part 1)."
 - c. 81.2-1991, "IEEE Guide for Measurement of Impedance and Safety Characteristics of Large, Extended, or Interconnected Grounding Systems (Part 2)."
 - d. 141-1993, "IEEE Recommended Practice for Electric Power Distribution for Industrial Plants."
 - e. 142-1991, "IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems."
4. ANSI Standard C2-1993, "National Electrical Safety Code" (NESC).

- B. **Listing and Labeling Agency Qualifications.** Components and materials shall be listed by a "Nationally Recognized Testing Laboratory" (NRTL) as defined in the Occupational Safety and Health Administration (OSHA) Regulation 1910.7.

1.4 SUBMITTALS

- A. **Submit the following** in accordance with Conditions of Contract and Division 1 specification sections:
1. Product data for each type of product specified.

1.5 JOB CONDITIONS (Not used)

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Deliver ground wire properly packaged** in factory-fabricated-type containers, or wound on National Electrical Manufacturers Association (NEMA) specified type wire reels.
- B. **Store grounding materials** and ground wire in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris, and traffic.
- C. **Handle grounding wire carefully** to avoid abrading, puncturing and/or tearing wire insulation. Ensure that dielectric resistance of the cable insulation is maintained.

1.7 **SPECIAL WARRANTY** (Not used)

PART 2 - PRODUCTS

2.1 **GROUNDING CONDUCTORS**

- A. **General.** Provide types indicated. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.
- B. **Bare Conductors**
 - 1. Copper Conductors. Conform to the following:
 - a. Solid Conductors. American Society for Testing and Materials (ASTM) B 3.
 - b. Assembly of Stranded Conductors. ASTM B 8.
 - c. Tinned Conductors. ASTM B 33.
 - 2. Aluminum Conductors. ASTM B 230 and B 231.
- C. **Insulated Conductors.** Refer to Section 26 05 12, "Wires, Cables, and Connectors."
- D. **Ground Bus.** Bare (tin-plated), annealed, 98 percent conductivity copper bars of rectangular cross section, 1/4" x 3" x length as required. Cable lug hole spacing 2 inches center to center minimum.
- E. **Braided Bonding Jumpers.** Flexible, 153,700-circular-mil braid, formed with 30 AWG tin-plated copper wire and terminated with crimp-type copper connectors or ground connector for copper braid to rod or tube.
- F. **Bonding Strap.** Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.2 **GROUNDING ELECTRODES**

- A. **Ground Rods.** One piece, copper clad steel with high strength steel core and electrolytic grade copper cladding 3/4" x 10'.
- B. **Plate Electrodes.** 98 percent conductivity copper plate, minimum 0.10 inch thick, square or rectangular, having an area of 4 square feet.
- C. **Enhanced Grounding Electrode.** 2 inch trade size Type K copper tube, minimum 10 feet long or longer as required by the Contract Documents, straight or L-shaped as required by subgrade conditions, capped on both ends, perforated with breather holes at the top and leach holes at the bottom, and partially filled with nonhazardous metallic salts. A short length of 4/0 AWG copper cable shall be welded to the tube for connection to the grounding electrode conductor, and a U bolted pressure plate connection shall be provided just under the top cap for a test point. Product shall be listed under UL 467J and ANSI 633.8, and shall include bentonite backfill material and protective flush box with grate type lid consistent with its listing.

2.3 **CONNECTORS**

- A. **General.** Listed and labeled as grounding connectors for the materials used.
- B. **Pressure Connectors.** High-conductivity plated units.
- C. **Bolted Clamps.** Heavy-duty units listed for the application.
- D. **Exothermic Welded Connections.** Provided in kit form and selected for the specific types, sizes, and combinations of conductors and other items to be connected.
- E. **Aluminum-to-Copper Connections.** Bimetallic type, conforming to UL 467.

2.4 **ACCESSORIES**

- A. **Ground Staple.** Square shank, barbed, hot dipped galvanized.
- B. **Ground Wire Guards.** 1" x 8'-0" molded, ultraviolet-light-stabilized plastic.

2.5 **MANUFACTURERS.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

- 1. Anixter Bros., Inc.
- 2. Burndy Corporation.
- 3. A.B. Chance Co.
- 4. Dossert Corp.
- 5. Erico Products, Inc.
- 6. Heary Bros., Inc.
- 7. Ideal Industries, Inc.
- 8. ILSCO.
- 9. Joslyn Manufacturing Co.

10. Lyncole XIT Grounding Div., Lyncole Industries, Inc.
11. Thomas and Betts.
12. Panduit Corp.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General

1. Ground electrical systems and equipment in accordance with NEC requirements except where the Contract Documents exceed NEC requirements.
2. Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors and grounding electrode conductors, except that larger sizes indicated or shown on the Contract Documents shall take precedence.
3. Connect the grounded service conductor to a grounding electrode at each service disconnect.

B. Grounding Electrodes

1. Ground Rods. Provide at least one ground rod at each building. Locate ground rods a minimum of one rod length from each other and at least the same distance from any other grounding electrode. Connect ground conductors to ground rods by means of exothermic welds except at test wells and as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel of the rod. Drive rods until tops are 24 inches below finished floor or final grade except as otherwise indicated.
2. Enhanced Grounding Electrode.
 - a. Provide enhanced grounding electrodes as follows:
 - 1) Where shown on the Contract Documents, or
 - 2) In the event that multiple driven grounds cannot provide the required resistance to earth.
 - b. Set tube vertically in a 6-inch-diameter drilled hole backfilled the first 6 inches with soil or gravel and the balance of the way up to within 4 inches of the top of the tube with a bentonite slurry, per manufacturer's instructions.
 - c. Place system protective box with grating type cover over the tube and grout in flush with finished grade, maintaining the inside of the box free and clear and open to the atmosphere.
 - d. Comply with all manufacturer installation instructions.

- e. In the event that the site is rocky and a vertical installation is impossible, provide an L shaped tube type chemically enhanced grounding electrode and install it in a 12-inch-wide trench a minimum of 30 inches deep such that the tube slopes down at the minimum rate of 1/8 inch per foot, beginning at the crook of the L shape. Comply with c and d above.

C. Conductors

- 1. Grounding Electrode Conductors.
 - a. Interconnect all grounding electrodes with a grounding electrode conductor sized as shown on the plans or as required by the NEC.
 - b. Route grounding electrode conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.
 - c. Bury exterior grounding electrode conductors at least 30 inches below grade.
 - d. Use bare, tinned, stranded copper except as otherwise indicated.
- 2. Equipment Grounding Conductors.
 - a. Provide equipment grounding conductors in all conduits containing power, control, or instrumentation conductors on the load side of the service equipment or on the load side of a separately derived system.
 - b. Use insulated copper conductors up to No. 6 AWG. Use bare stranded copper for sizes No. 4 AWG and larger.

D. Grounding Connections

- 1. General. Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - a. Use electroplated or hot tin coated materials to ensure high conductivity and make contact points closer in order of galvanic series.
 - b. Make connections with clean bare metal at points of contact.
 - c. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.
 - d. Aluminum to galvanized steel connections shall be with tin plated copper jumpers and mechanical clamps.
 - e. Coat and seal connections involving dissimilar metals with inert material such as bituminous paint to prevent future penetration of moisture to contact surfaces.

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2. Exothermic Welded Connections. Use for connections to structural steel and for all underground connections. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
3. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a grounding conductor to a ground bus or stud in the housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and grounding conductors. Size bonding conductors per NEC 250.122 based upon the largest overcurrent protection device trip setting for any contained conductor.
4. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.
5. Compression-Type Connections. Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
6. Moisture Protection. Where insulated grounding conductors are connected to ground rods or ground buses, insulate the entire area of the connection and seal against moisture penetration of the insulation and cable.
7. Ensure that grounding electrode conductor connections to interior piping, structural members, and the like are accessible for periodic inspection during the life of the structure.

E. **Equipment Grounding**

1. Building Steel. Exposed structural steel building framework shall be bonded to the grounding electrode conductor with a conductor of the same size as the service entrance grounding electrode conductor, per NEC 250.104(C).
2. Underground Distribution System Grounding.
 - a. Manholes and Handholes. Provide a driven ground rod close to the wall and set the rod depth such that 4 inches will extend

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- above the finished floor. Where necessary, install ground rod before the manhole is placed and provide a 1/0 AWG bare tinned copper conductor from the ground rod into the manhole through a sleeve in the manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure sensitive tape or heat shrunk insulating sleeve from 2 inches above to 6 inches below the concrete.
- b. Connections. Ground all non-current-carrying exposed metal parts associated with manholes, substations, and pad-mounted equipment to the ground rod or ground conductor. Make connections with minimum No. 4 AWG stranded copper wire. Train conductors plumb or level around corners and fasten to manhole walls. Connect to cable armor and cable shields by means of tinned terminals soldered to the armor or shield, or as recommended by manufacturer of splicing and termination kits. Interconnect bare grounding conductors carried with incoming or outgoing circuits with the manhole grounding system.
 - c. Grounding System. Ground non-current-carrying metallic items associated with manholes, substations, and pad-mounted equipment by connecting them to bare underground cable and grounding electrodes arranged as indicated.
3. Metal Light Poles. Provide each light pole with a driven ground rod. Provide a grounding electrode conductor for connecting the rod to the pole and to the branch circuit ground conductor.
 4. Bridges.
 - a. Structure Grounding. Provide a complete grounding system for each bridge, wall, or other structure having metallic electrical raceways or junction boxes mounted in or on the structure, structure mounted lighting, or metallic handrails.
 - b. Bridges with Steel Girders.
 - 1) Provide a minimum of two grounding electrodes, one on each side, at each abutment, plus a grounding electrode at each outside column at each fixed pier. Connect electrodes to girders with 2/0 AWG insulated conductor in 1 inch Schedule 40 polyvinyl chloride (PVC) conduit concealed inside the abutment or column.
 - 2) Bond outside girders together laterally and longitudinally with 2/0 AWG bare cable with adequate slack to allow for expansion and contraction.
 - 3) Make all connections to the structure with exothermic welds and paint all welds and exposed bare cable with two coats of insulating varnish.
 - c. Bond light poles, metallic conduit systems, and metallic junction boxes to the structure grounding system with 2/0 AWG cable.

3.2 **FIELD QUALITY CONTROL**

- A. **Tests.** Subject the completed grounding system to a ground resistance test at each location where a maximum ground resistance level is specified and at service disconnect enclosure ground terminal. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
- B. **Ground/resistance maximum values** shall be as follows:
 - 1. Equipment Rated 500 Kilovolt Amperes (kVA) and Less. 10 ohms.
 - 2. Equipment Rated 500 kVA to 1000 kVA. 5 ohms.
 - 3. Equipment Rated over 1000 kVA. 3 ohms.
 - 4. Unfenced Substations and Pad Mounted Equipment. 5 ohms.
 - 5. Manhole Grounds. 10 ohms.
 - 6. Fence Grounds. 10 ohms.
 - 7. Structure Grounds. 25 ohms.
- C. **Deficiencies.** Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are directed that exceed those indicated, the provisions of the Contract covering change orders will be applied.
- D. **Report.** Prepare test reports of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.3 **CLEANING AND ADJUSTING**

- A. **Restore surface features** at areas disturbed by excavation and reestablish original grades except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work to their original condition. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging, or mulching. Maintain disturbed surfaces. Restore vegetation and disturbed paving as necessary.

3.4 **LABELING. Provide labeling for the grounding system** as specified in Section 26 05 53, "Electrical Identification."

3.5 **DEMONSTRATION. Provide a verification tour** of all grounding electrode conductor connections for the Engineer/Architect and the Owner. Review test reports which verify compliance of ground system with Contract requirements.

END OF SECTION

SECTION 26 05 29

SUPPORTING DEVICES

PART 1 – GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.
- 1.2 **DESCRIPTION OF THE WORK.** Provide the labor, tools, equipment, and materials necessary to furnish and install supporting materials and assemblies, sleeves, and seals in accordance with the plans and specifications.
- 1.3 **QUALITY ASSURANCE.** Materials and workmanship shall be in accordance with the following standards as reference herein.
 - A. National Electrical Code (NEC) Compliance. Components and installation shall comply with National Fire Protection Association (NFPA) 70 (NEC).
 - B. Certification. Manufactured electrical components shall be listed and labeled by either Underwriters' Laboratories, Inc. (UL), Electrical Testing Laboratories, Inc. (ETL), Canadian Standards Association (CSA), or other approved, nationally recognized testing and listing agency that provides third party certification follow-up services.
 - C. Manufacturers Standardization Society (MSS) Compliance. Comply with applicable MSS standard requirements pertaining to fabrication and installation practices for pipe hangers and supports.
 - D. National Electrical Contractors Association (NECA) Compliance. Comply with NECA's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.
 - E. Federal Specification (FS) Compliance. Comply with FS FF-S-760 pertaining to retaining straps for conduit, pipe, and cable.
 - F. Metal Framing Manufacturers Association Standard Publication (MFMA)-1.
 - G. American Institute of Steel Construction "Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings," including "Commentary" of supplements thereto, as issued.
 - H. The Aluminum Association "Specifications for Aluminum Structures."
 - I. Supports, anchors, sleeves, and seals furnished as part of factory-fabricated equipment are specified as part of that equipment assembly in other divisions and Division 26 sections.
- 1.4 **SUBMITTALS.** Submit all submittals in accordance with the Division 1 and this specification section.

A. **SUBMITTAL PACKAGE NO. 1** – Product Data and Shop Drawings

1. Package contents

- a. Product data for each type of product specified.
- b. Hanger and support schedule showing manufacturer's figure, number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.
- c. Shop drawings indicating details of fabricated support assemblies.
- d. Fire stop systems
 - 1) Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration fire-stop system, and each kind of construction condition penetrated and kind of penetrating item.
 - 2) Include fire-stop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 - 3) Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through penetration fire-stop configuration for construction and penetrating items.
 - 4) Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through penetration fire-stop condition, submit illustration approved by fire-stopping manufacturer's fire protection engineer with modifications marked.
 - 5) Product certificates signed by manufacturers of fire-stopping products certifying that their products comply with specified requirements.
 - 6) Product test reports from, and based on tests performed by, a qualified testing and inspecting agency evidencing compliance of fire-stopping with requirements based on comprehensive testing of current products.
 - 7) Certification by fire-stopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.

1.5 **JOB CONDITIONS** (Not used)

1.6 **DELIVERY, STORAGE, AND HANDLING.** In accordance with Section 01 60 00.

1.7 SPECIAL WARRANTY (Not used)

PART 2 – PRODUCTS

2.1 **MANUFACTURED SUPPORTS**

A. **General.** Provide manufactured support devices which are listed and labeled. In the event that more than one type of supporting device meets the requirements of the project, and none is specifically shown, device selection is the Contractor's option.

B. **Materials**

1. U-channel, clamps, and hangers for supporting conduit and equipment shall be Type 316 stainless steel.
2. Parts, screws, nuts, and rod shall be Type 316 stainless steel.
3. Strut extruded from aluminum alloy 6036-T6 may be substituted for stainless steel where it will not be in contact with concrete or grout and when its strength is sufficient for the application.
4. Provide fittings and accessories made from aluminum alloy 5052-H32 for aluminum strut.

C. **Products shall include** but are not limited to the following:

1. Clevis Hangers. Steel for supporting rigid metal conduit, with 3/8-inch hanger rod through 2-inch conduit size; 1/2-inch hanger, 2-1/2-inch and larger conduit size.
2. Round Steel Rod. Zinc plated, threaded at ends only, 1/2-inch minimum size except as stated in 1 above, with zinc plated hexagon nuts.
3. Beam Clamp. Malleable iron with 1/4-inch tapped side and back holes for attachment of conduit clamps.
4. Swivel Beam Clamp. Malleable iron for use with hanger rod. Clamp to have swivel eye hook, closed in the installed position, and malleable iron swivel eye tapped for the hanger rod to which it is attached. Provide jamb nut.
5. I-Beam Clamps. Steel, 1-1/2-inch-x-3/16-inch stock, 1/2-inch hook rod in 8-, 11-, or 14-inch lengths, as required, with double eye swing connector threaded for 1/2-inch rod. Provide jamb nut for support rod.
6. Conduit Straps. Malleable iron, one hole.
7. Clamp Backs. Malleable iron, for use with one hole conduit strap to support conduit away from wall or ceiling surface.
8. Two-Hole Conduit Straps. Steel, minimum 1/8-inch-thick heavy-duty, zinc electroplated.

9. Conduit Hangers.
 - a. Steel, zinc electroplated, for hanging conduit from beam clamps.
 - b. With 1/4-inch, 20-thread, zinc electroplated closure bolt and square nut.
 - c. Provide 1/4-inch, 20-thread zinc-electroplated stove bolt to secure hanger to beam clamp.

10. Riser Clamps. Two cold rolled steel bars, formed to fit the conduit to be supported, 8-1/2-inch-plus-conduit trade diameter long by 1-inch tall (2 inches for 5 inch and larger trade size conduit) by 3/16-inch-thick (1/2 inch through 1-1/2-inch trade size; 1/4 inch thick, 2- through 6-inch trade size), with zinc-electroplated finish. Bars shall be secured around conduit with two electroplated hexhead cap screws and hex nuts.

11. Fasteners and Anchors.
 - a. Provide fasteners and anchors to assemble supports and to secure supports to structures.
 - b. Fasteners, including bolts, nuts, washers, self-tapping anchors, and expansion anchors to be installed out-of-doors, below grade level, or in corrosive atmospheres or process areas shall be stainless steel.
 - c. Anchors for securing 3/4- or 1-inch conduit straps and device boxes to sound concrete walls and ceilings shall be self-tapping anchors in accordance with Section 05 05 23 "Anchors" in areas not requiring stainless steel.
 - d. For anchors for use in securing conduit larger than 1 inch, heavier equipment than device boxes, and all fasteners to be used in areas enumerated above as requiring stainless steel fasteners, provide stud type expansion anchors, drop-in two-piece expansion anchors, or adhesive stud anchors in accordance with Section 05 05 23 "Anchors."
 - e. Fasteners for securing conduit or equipment to metal plate or metal structural members shall be welded studs applied by the electric arc method.
 - 1) Studs for stainless steel or aluminum shall be of the same material as the base metal.
 - 2) Studs for use in damp or wet environments or out-of-doors shall be stainless steel for use on low carbon steel or stainless steel.
 - 3) Studs shall be similar and equal to TRW Nelson Stud Welding Division low carbon or mild steel or Type 304 or 305 stainless steel, applied with a Nelson stud welder.

- f. Provide cable supports for vertical conduit that are a factory fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits.
 - 1) Provide plugs with number and size of conductor gripping holes as required to suit individual risers.
 - 2) Construct body of malleable iron casting with hot dip galvanized finish.
- 12. Provide external cable grips for all flexible cords and cables falling under the purview of NEC Article 400, longer than 6 feet, which do not contain an internal dedicated steel support wire.
 - a. Grips shall be split mesh type capable of being installed and removed with the cable connected to the supply fitting and the supplied equipment.
 - b. Mesh shall be high grade tin coated bronze strand for cable supports in noncorrosive interior applications and Type 302/304 stainless steel for exterior or corrosive atmosphere interior installations.
 - c. Grips shall be lace type (not rod type) and shall be single or double weave as required to support the load with a support safety factor of 10 times the supported load plus 250 pounds.
 - d. Grips shall be similar and equal to Kellems 022 series.
- 13. U-Channel. 1-1/2" x 1-1/2" 12-gauge with solid base or bolt-hole base as required. Provide spring nuts or spring studs and related hardware of material specified hereinbefore appropriate to the U-channel material.
- 14. Lightweight U-Channel. 5/16" x 1/2" nominal, 18-gauge for support of surface lighting fixtures mounted on the underside of suspended ceiling systems or outlets flush in suspended ceiling systems. Provide 1/4-inch threaded rod and square nuts, box mounting studs, and channel fasteners as appropriate.
- 15. Perforated Sheet Steel. Provide perforated 11-gauge Type 316 stainless steel sheet. Sheet shall have 1/4-inch holes on 3/8-inch centers. Provide sizes as shown.

2.2 **STRUCTURAL SHAPE SUPPORTS**

- A. **General.** Provide structural shape supports in the form of individual structural aluminum channel or W-shapes fabricated from aluminum alloy 6061-T6. Size support members to perform their support functions without deflection of more than one half percent of total height for vertical members and 1 percent of total span for other than vertical members.
- B. **Protection.** Thoroughly coat aluminum members in contact with concrete or the earth with alkali resistant bituminous paint.

2.3 **FABRICATED SUPPORTS**

- A. **General.** Provide fabricated support assemblies constructed of structural shapes welded together to form a complete, secure, and durable assembly and finished appropriately to withstand the environment in which they are to be employed.
- B. **Materials.** Provide structural aluminum angles, channels, and W-shapes hereinbefore specified in natural aluminum finish.
- C. **Fabrication**
 - 1. Assemble aluminum shapes by gas metal-arc welding, using ER4043 filler metal for maximum crack resistance. Welding shall be performed by a welder who has successfully passed the American Welding Society (AWS) welding qualification test for AWS D1.2 “Structural Welding Code-Aluminum.”
 - 2. Grind smooth and flush welds so as to present a noninterfering surface for equipment mounting.

2.4 **CONDUIT SEALS**

- A. **General.** Provide seals around conductors inside conduits and between conduits and sleeves/bored holes through which conduits penetrate concrete walls and floors.
- B. **Mechanical Seals.**
 - 1. Provide conduit internal sealing bushings composed of two brass or bronze pressure discs, three stainless steel socket head cap screws, and a neoprene gasket.
 - 2. Factory predrill pressure discs and gasket to match size and number of cables in the conduit to be sealed.
 - 3. Seals shall be similar and equal to O-Z/Gedney CSB series, and rated to withstand 50 pounds per square inch gauge (psig) water or gas pressure.

2.5 **WALL/FLOOR SEALS**

- A. **General.** Provide seals around sleeves or conduits penetrating concrete walls which are below grade or water-bearing walls and concrete floors through which conduits pass from below grade.
- B. **Materials**
 - 1. Provide high-strength malleable or ductile iron body and pressure clamp, hot dip galvanized, with Type 316 stainless steel hex head tightening bolts.
 - a. Body shall include fins designed to prevent water from creeping along the outside of the body.

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- b. The body shall fit over and seat against a sleeve of high strength, high impact plastic pipe or steel pipe with high organic zinc conductive epoxy coating.
 - c. A neoprene O-ring shall be included between the body and sleeve to provide a seal between them.
 - d. Two close fitting pressure rings of polyvinyl chloride (PVC) coated steel shall be located on each side of a neoprene grommet through which the entering conduit passes, which grommet is compressed by the pressure clamp as the tightening bolts are screwed into the body.
 - e. Assembly shall be similar and equal to O-Z/Gedney FSK series.
2. Provide flanged conduit pipe mounted on the wall or floor over the hole requiring sealing.
- a. Secure with stainless steel expanding anchor type studs or adhesive anchor system in accordance with Section 05 05 23.
 - b. Studs shall be the largest diameter which will fit through the predrilled holes in the conduit pipe flange; provide one stud per predrilled hole.
 - c. Pipe and flange shall be 0.098 inch thick steel with hot dipped galvanized finish.
 - d. Provide a fire-resistant synthetic rubber (FRR) gasket between the flange and the wall to fill voids created by minor wall surface irregularities.
 - e. Flanged conduit pipe shall be equal to CSD Sealing Systems (CSD) F series with HFS series gasket.
 - f. Provide an FRR plug to securely close the space between the inner wall of the flanged conduit pipe and the outside of the through passing conduit.
 - 1) Serrated on its outer and inner walls.
 - 2) Flat flange on one end to aid in insertion in the pipe.
 - 3) Pressure resistance of 15 psi at the base and 30 psi at the flange.
 - 4) Manufactured by the flanged conduit pipe manufacturer for use with that product.
 - 5) Properly sized to perform its sealing function.

2.6 SLEEVES

A. General

- 1. Provide sleeves in interior, nonwater-bearing, cast-in-place concrete construction and in masonry construction to permit the passage of

electrical raceways, cable trays, and busways through walls and floors, ceilings and roofs.

2. Fabricate sleeves of substantial materials to retain their shape through the construction process and to be compatible with seals or fire-stops required.

B. Material

1. Sleeves for conduit penetrating cast-in-place concrete shall be galvanized sheet steel, rigid galvanized conduit, or Schedule 80 PVC conduit as follows:
 - a. Provide heavy wall rigid galvanized steel conduit or sleeves fabricated from galvanized sheet steel having the same thickness as equivalent heavywall rigid conduit and with welded seams ground smooth.
 - b. Cut ends of sleeves and seams of fabricated sleeves shall be coated with cold process galvanizing after cutting/fabrication.
 - c. Use metal sleeves only in locations exposed to the air on both sides after construction is complete and in dry locations.
2. Provide heavywall PVC conduit sleeves (Schedule 80) for damp locations such as basement areas and out-of-doors in locations where there will be no requirement for sealing the sleeve, as from groundwater, or for fire-stopping the sleeve.

2.7 FIRE-STOPS

A. General

1. Provide fire-stops around conduit, outlet boxes or fittings, cable tray, busway, or other electrical work which penetrates fire-rated walls, floors, or ceilings.
2. Fire-stops shall be fabricated to UL Standard, "Penetration Fire-stop Systems," per ASTM E 814 (American National Standards Institute [ANSI]/UL 1479) Fire Test or UL Standard, "Fire Tests of Building Construction and Materials," ANSI/UL 263 (ASTM E 119, NFPA 251).
3. Provide materials which will form a smoke and fire barrier which will withstand temperatures up to 2,000 degrees Fahrenheit (^o F.) for at least the minimum time for which the fire-stop assembly penetrated is rated.

B. Materials

1. Metallic Conduit Interior Protection.
 - a. Provide a two part elastomer which foams in place and expands to fill complex geometric shapes, and provide a compression seal in ambients of up to +200 degrees Celsius (^o C.) to -55^o C.

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- 1) Sealant shall be compatible with insulation and cable sheath materials with which it will be in contact when installed.
 - 2) Material shall be similar and equal to Dow Corning 3-6548 Silicone RTV Foam or 3M Fire Barrier 2001 Silicone RTV Foam
 - 3) Apply only in a spark free environment.
- b. Provide a one part silicone nonsag elastomer which emits no hazardous, irritating, or combustible fumes.
- 1) Sealant shall be applied with a pump or caulking gun per the manufacturer's instructions to form a nonshrinking flexible seal.
 - 2) Material shall be similar and equal to Nelson CLK N/S or 3M Fire Barrier 2000.
2. Metallic busway, cable tray, cable ladder, armored cable, and conduit penetration fire-stopping.
- a. Provide expanding foam or elastomeric putty or pillows to fire-stop penetrations in fire rated assemblies.
- b. In addition, provide fire resistive panels on both sides of the fire barrier penetration if required to obtain the necessary fire resistance rating or to provide a cofferdam to restrain the sealant material during the installation and curing process.
- c. Materials shall be as follows:
- 1) RTV Foam. Similar and equal to Dow Corning 3-6548 Silicone RTV Foam or 3M Fire Barrier 2001 Silicone RTV Foam.
 - 2) Elastomeric Putty. Similar and equal to 3M Fire Barrier 2000 (nonslump) or 2003 (self-leveling) or Nelson CLK N/S (nonsag) or CLK S/L (self-leveling).
 - 3) Fire Resistive Panel. Similar and equal to 3M Fire Barrier CS-195+ or Nelson CPS.
- 2.8 **MANUFACTURERS.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
- A. Slotted Metal Angle and U-Channel Systems.
1. B-Line (Cooper).
 2. Thomas & Betts.
 3. American Electric (Steel City).
 4. Unistrut Diversified Products.

- B. Conduit Supports.
 - 1. Appleton.
 - 2. Cantex, Inc.
 - 3. Carlon.
 - 4. Crouse-Hinds.
 - 5. Killark.
 - 6. Raco, Inc.
 - 7. Robroy.
 - 8. Thomas & Betts Corp.

- C. Fasteners and Anchors.
 - 1. Hilti.
 - 2. ITW Buildex.
 - 3. Ideal Industries, Inc.
 - 4. Rawlplug Co.

- D. Seals and Fire-Stops.
 - 1. CSD Sealing Systems.
 - 2. Dow Corning.
 - 3. 3M.

- E. Conductor and Cable Supports.
 - 1. B-Line Systems.
 - 2. Condux International, Inc.
 - 3. Kellems, Division of Hubbell, Inc.
 - 4. O-Z/Gedney.
 - 5. Pass & Seymour/Legrand.
 - 6. Red Seal Electric Co.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. **Install supporting devices** to fasten electrical components securely and permanently in accordance with NEC requirements.

- B. **Coordinate with the building** structural system and with other electrical installations.

- C. **For raceway supports**, comply with the NEC and the following requirements:
 - 1. Conform to manufacturer's recommendations for selection and installation of supports.

 - 2. Secure supports to the surface upon which they are mounted with fasteners adequate to carry the present and any indicated future working loads by a safety factor of four times the total working load, defined as

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the ultimate load. When the ultimate load calculation, either in tension or shear of any fastener is less than 200 pounds, provide fasteners which will develop an ultimate strength of at least 200 pounds in either tension or shear, as applicable, for each support.

3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support parallel runs of horizontal raceways together on trapeze type hangers.
5. Support individual suspended horizontal conduit runs on pipe hangers suspended on 3/8 inch steel rod from swivel type supports securely anchored to structure. Do not use spring steel clips or other attachments to suspended ceiling supports.
6. Secure conduit clamps to concrete or masonry walls with concrete screw anchors, stud type expansion anchors, drop-in two-piece anchors, or adhesive stud anchors as strength requirements dictate.
 - a. Provide stainless steel anchors in damp or wet areas, areas subject to hose down, or out-of-doors.
 - b. Provide clamp backs for conduit installed on damp or wet walls and for all aluminum conduit on concrete or masonry walls.
7. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
8. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
9. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
10. In all-steel construction, where through fasteners are not appropriate, provide welded threaded studs. In damp or wet areas or out-of-doors, studs shall be stainless steel or, for aluminum base material, aluminum as specified.
11. Provide raceway supports as required by the NEC and install as recommended by NECA.
12. Support conduits in concrete duct banks with nonmetallic spacer to maintain conduit spacing during concrete pour.

- D. **Install vertical conductor supports** simultaneously with installation of conductors.
- E. **Miscellaneous Supports.** Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
- F. **In open overhead spaces,** cast boxes with hubs threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 2 feet from the box.
- G. **Support duct banks entering building,** manholes, handholes, and other structures as shown.
- H. **Install sleeves in concrete slabs** and walls and all fire-rated assemblies.
- I. **Seal all sleeves penetrating concrete** water-bearing walls or exterior walls below grade with mechanical seals. In new construction, cast seals into walls or floors. Provide surface mounted mechanical seals over holes cut in existing below grade walls.
- J. **Seal the interior of all conduits** entering from below grade with seals as specified. Provide similar seals for conduits in existing water-bearing walls.
- K. **Do not use wood screws** except in construction made of wood. Wood screws shall be round head or lag type with electrogalvanized or hot dip galvanized finish.
- L. **Provide No. 8 or larger sheet metal screws** into metal studs in drywall construction. Do not use toggle bolts in drywall ceilings or walls.
- M. **Provide fire-stops as specified** around electrical work penetrating fire rated assemblies. Install in accordance with the standard UL drawing for the greater fire resistance at the barrier.
- N. **Provide supports fabricated from structural steel** or aluminum shapes as shown or as required to support equipment.
- O. **Provide supports for luminaries** mounted on the bottom of suspended ceilings.
 - 1. Construct supports of lightweight U-channel spanning at least two lathers channels or main grid rails with 1/4-inch threaded rod through the ceiling system into the four corners of fluorescent or high intensity discharge (HID) fixtures.

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2. Provide a minimum of two 1/4-inch threaded rods to support smaller ceiling surface mounted incandescent or parallel lamp (PL) fluorescent fixtures.
 3. Provide fixture stud and carrier to support flush outlet boxes in the ceiling treatment or tile from the U-channel.
- P. **Provide stainless mounting hardware** for securing electrical equipment to perforated sheet steel.
- Q. **The following supports and support methods** are specifically prohibited:
1. Strap iron.
 2. Wire of any type.
 3. Welding other than stud welding as specified.
 4. Plastic ties.
 5. Piggyback clamps (one conduit supported from another conduit or pipe).
 6. Devices which depend upon spring tension to support conduit or to remain in place.
 7. Power driven anchors.
 8. Clip type devices to secure lighting fixtures to the bottom of lay-in style suspended ceiling grids.

END OF SECTION

SECTION 26 05 33

RACEWAY

PART 1 – GENERAL

1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 **DESCRIPTION OF WORK**

A. **General.** Provide the labor, tools, equipment, and materials necessary to install raceways in accordance with the plans and the specifications.

B. **Types.** Types of raceways specified in this section include the following:

1. Electrical metallic tubing.
2. Flexible metal conduit.
3. Intermediate metal conduit.
4. Liquidtight flexible metal conduit.
5. Underground plastic utilities duct.
6. Rigid metal conduit.
7. Rigid nonmetallic conduit.
8. Liquidtight flexible nonmetallic conduit.
9. Surface raceways.
10. Wireways.

1.3 **QUALITY ASSURANCE**

A. **Codes and Standards.** Perform all work associated with raceways in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.

1. National Electrical Code (NEC). Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code."
2. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA standards pertaining to raceways.
3. Underwriters' Laboratories, Inc. (UL) Compliance and Labeling. Comply with applicable requirements of UL standards pertaining to electrical raceway systems. Provide raceway products and components listed and labeled by UL, Electrical Testing Laboratories (ETL), or Canadian Standards Association (CSA).

1.4 **SUBMITTALS.** Submit in accordance with the Division 1 and this specification section.

A. **Submittal Package No. 1 –Product Data, Samples, and Instructions**

1. Furnish manufacturer's product data, test reports, and materials certifications as required.
 2. Provide manufacturer's written installation instructions for wireway, metallic raceway, and nonmetallic raceway products.
- 1.5 **JOB CONDITIONS.** Coordinate with other work, including wires/cables, boxes, and panels, as necessary to interface installation of electrical raceways and components with other work
- 1.6 **DELIVERY, STORAGE, AND HANDLING** (Not used)
- 1.7 **SPECIAL WARRANTY** (Not used)

PART 2 – PRODUCTS

2.1 **METAL CONDUIT AND TUBING**

- A. **Electrical Metallic Tubing (EMT).** Steel, hot dip galvanized conforming to American National Standards Institute (ANSI) C80.3 and UL 797.
- B. **Rigid Steel Conduit.** Rigid steel, hot dip galvanized, threaded type conforming to Federal Specification (FS) WW-C-581E, ANSI C80.1 and UL 6.
- C. **Intermediate Steel Conduit.** Rigid intermediate grade, hot dip galvanized conforming to FS WW-C-581E, ANSI C80.1, and UL 1242.
- D. **Polyvinyl Chloride (PVC) Externally Coated Rigid Steel Conduit.** Rigid steel, hot dip galvanized with 40 mil external coating of PVC and 2 mil internal urethane coating conforming to ANSI C80.1 and NEMA RN 1. The PVC coated galvanized rigid conduit must be ETL Verified to the Intertek ETL SEMKO High Temperature H2O PVC Coating Adhesion Test Procedure for 200 hours. The PVC coated galvanized rigid conduit must bear the ETL Verified PVC-001 label to signify compliance to the adhesion performance standard.
- E. **Rigid Aluminum Conduit.** Rigid aluminum conduit conforming to ANSI C80.5.
- F. **Flexible Metal Conduit.** FS WW-C-566 and UL 1. Continuous, spirally wound, interlocked galvanized strip steel.
- G. **Liquidtight Flexible Metal Conduit.** Single strip, flexible, continuous, interlocked, and double wrapped steel; galvanized inside and outside; covered with liquidtight jacket of flexible PVC conforming to UL 360.
- H. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 1. AFC.
 2. Alflex Corp.
 3. Allied Tube and Conduit.

4. Electri-Flex Company.
5. LTV Copperweld.
6. Perma-Cote Industries.
7. Robroy Industries, Inc.
8. Wheatland Tube Co.
9. KorKap.

2.2 **NONMETALLIC CONDUIT**

- A. **Rigid Nonmetallic Conduit.** PVC, Schedule 40, 90 degrees Celsius ($^{\circ}$ C.), conforming to NEMA TC-2, UL 651, and NEC Article 347.
- B. **Rigid Nonmetallic Conduit (Heavy Wall).** PVC, Schedule 80, 90 $^{\circ}$ C., conforming to NEMA TC-2, UL 651, and NEC Article 347.
- C. **Liquidtight Flexible Nonmetallic Conduit.** Continuous spiral of hard PVC encapsulated with flexible PVC conforming to UL 1660.
- D. **Electrical Nonmetallic Tubing.** PVC conforming to NEMA TC-13.
- E. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
 1. Alflex.
 2. Cantex Industries.
 3. Carlon.
 4. Electric-Flex.

2.3 **CONDUIT FITTINGS AND ACCESSORIES**

- A. **General.** Provide conduit accessories of types, sizes, and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.
- B. **Conduit Bodies**
 1. **General.** Provide conduit bodies of types, shapes, and sizes as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion resistant screws.
 2. **Rigid Metal.** Threaded galvanized cast iron conforming to UL 514B and FS W-C-586D.
 3. **Hazardous Locations.** Threaded aluminum approved for hazardous locations as shown.
 4. **EMT.** Compression type conforming to UL 514B.
 5. **Nonmetallic.** PVC, molded solvent weld connector conforming to UL 514B.
- C. **Locknuts.** Construct locknuts with sharp edge for digging into metal and ridged outside circumference for proper fastening.

- D. **Bushings.** Metal, flared bottom, ribbed sides, set screw type grounding terminal and smooth rounded inner circumference.
- E. **Conduit Hubs.** Threaded hub, metal, locknut/bushing, gasket.
- F. **Rigid Metal Conduit Fittings.** Threaded cast malleable iron galvanized or aluminum, fittings conforming to FS W-F-408.
- G. **EMT Fittings.** Steel, compression type conforming to UL 514B.
- H. **Flexible Metal Conduit Fittings.** Provide conduit fittings for use with flexible steel conduit of threadless hinged-clamp type.
 - 1. Straight Terminal Connectors. One piece body, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
 - 2. 45-Degree or 90-Degree Terminal Angle Connectors. Two-piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and male threaded end provided with locknut.
- I. **Liquidtight Flexible Metal Conduit Fittings.** FS W-F-406, Type 1, Class 3, Style G. Galvanized malleable iron fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated or noninsulated throat.
- J. **Rigid Nonmetallic Conduit Fittings.** NEMA TC 3, mate and match to conduit type and material.
- K. **Liquidtight Flexible Nonmetallic Conduit Fittings.** PVC, one piece body with PVC ferrule and neoprene gasket.
- L. **Sealing Fittings and Products**
 - 1. Joint Sealants. Refer to Section 26 05 29, "Supporting Devices."
 - 2. Provide gland type sealing bushings for interior conduit seals. See Section 26 05 29, "Supporting Devices."
 - 3. Explosionproof Seals. Suitable for Class I, Division I, Group D atmosphere.
- M. **Escutcheon Plates.** Chrome plated, stamped steel, hinged, split-ring escutcheon, with set screw.
 - 1. Inside diameter shall closely fit conduit outside diameter.
 - 2. Outside diameter shall completely cover the opening in floors, walls, or ceilings.
- N. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering conduit fittings which may be incorporated in the work include, but are not limited to, the following:

1. Fittings.
 - a. Adalet.
 - b. Appleton Electric.
 - c. Carlon.
 - d. Condux International, Inc.
 - e. Crouse-Hinds.
 - f. Electri-Flex Company.
 - g. Killark Electric Mfg. Co.
 - h. Kraloy.
 - i. O.Z. Gedney.
 - j. Perma-Cote Industries.
 - k. Racor (Hubbell).
 - l. Robroy Industries.

2. Escutcheon Plates.
 - a. Chicago Specialty Mfg. Co.
 - b. Sanitary-Dash Mfg. Co.

2.4 **WIREWAYS**

- A. **General.** Provide electrical wireways of types, grades, sizes, and number of channels for each type of service as indicated. Provide complete assembly of raceway including, but not limited to, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other components and accessories as required for complete system.

- B. **General Purpose Wireways.** NEMA 1 steel, front accessible, totally enclosed with bolted covers.
 1. Finish with rust-inhibiting coating and gray baked enamel finish.
 2. Protect screws installed toward inside of wireway with spring nuts to prevent wire insulation damage.

- C. **Oiltight Wireways.** NEMA 12, oiltight and dusttight steel with hinged gasketed cover, external latches, and flanged gasketed joints. Finished with gray enamel paint inside and outside.

- D. **Watertight Wireways.** NEMA 4X, watertight, corrosion resistant stainless steel with hinged gasketed cover, screw clamps, and flanged gasketed joints.

- E. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering wireways which may be incorporated in the work include, but are not limited to, the following:
 1. American Electric.
 2. B-Line Systems, Inc. (Copper).
 3. Cross Brothers, Inc.
 4. Erickson Electric Equipment Co.

5. GS Metals Corp.
6. Hoffman (Enclosures).
7. Square D Company.

PART 3 – EXECUTION

3.1 EXAMINATION.

- A. **Examine areas and conditions** under which raceways are to be installed, and substrate which will support raceways.
- B. **Notify Engineer/Architect** in writing of conditions detrimental to proper completion of the work.
- C. **Do not proceed with work until unsatisfactory conditions have been corrected** in a manner acceptable to the Engineer/Architect.

3.2 PREPARATION

- A. **General.** Field-bend conduit with benders designed for the purpose so as not to distort or vary the internal diameter. Cut conduits straight and properly ream to remove burrs.
- B. **Metal Conduits.**
 1. Cut conduit threads deep and clean.
 2. Use of running threads at conduit joints and terminations is prohibited.
 3. Conduits installed underground, in slabs, or exterior shall have threads painted with a corrosion inhibiting compound before couplings are assembled.
 4. Isolate aluminum conduits in contact with reinforced concrete using a bitumastic coating.
- C. **Nonmetallic Conduits.** All PVC conduit joints shall be solvent welded to provide a watertight seal capable of sustaining an internal or external pressure of 25 pounds per square inch (psi) for 1 hour. Install PVC conduit in a sand bed except PVC conduit encased in concrete.
- D. **Install joint sealers** and mechanical pipe seals as specified in Section 26 05 29, "Supporting Devices."

3.3 INSTALLATION - GENERAL

- A. **Complete the installation of raceways** before starting installation of cables and wires in raceways.
 1. All spare raceways shall be capped or plugged and include a pull wire.
 2. All metallic raceways shall be grounded.

- B. **Install raceways as indicated** in accordance with manufacturer's written installation instructions, and in compliance with NEC and National Electrical Contractors Association (NECA) "Standards of Installation."
 - 1. Use roughing-in dimensions furnished by the supplier for all electrically operated units.
 - 2. Set raceways and boxes for connection to units only after the dimensions and locations clear with other trades.
 - 3. Install units plumb and level, and maintain manufacturer's recommended clearances.

- C. **Mechanically assemble metal raceways** for conductors to form continuous electrical conductor, and make connections to electrical boxes, fittings, and cabinets to provide effective electrical continuity and a rigid mechanical assembly.
 - 1. Avoid the use of dissimilar metals throughout the system to eliminate the possibility of electrolysis.
 - 2. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.

- D. **Size conduits to meet the NEC** requirements, except no conduit shall be smaller than 3/4 inch for interior applications or 1 inch for exterior applications. The diameter of embedded conduits shall not exceed one-third of the slab or wall thickness.

3.4 **INSTALLATION - CONDUITS**

- A. **Uses Permitted**
 - 1. Use EMT only for concealed work in finished areas with metal or wood stud construction.
 - 2. Use flexible metal conduit in finished areas only and only from boxes to recessed lighting fixtures (6-foot maximum length) or for concealed work in existing walls.
 - 3. Use liquidtight flexible metalconduit for the final 24 inches of connections to motors or equipment subject to movement or vibration.
 - 4. Use PVC coated rigid steel conduit in areas exposed to severe moisture or corrosive conditions as designated on the plans.
 - 5. Use Schedule 80 PVC conduit exposed only as specifically designated on the plans for areas exposed to severe moisture or corrosive conditions.
 - 6. Use rigid metal conduit (RMC) or intermediate metal conduit (IMC) for all other interior installations not exposed to severe moisture or corrosive conditions.
 - 7. Use Schedule 40 PVC for conduits located in slabs or under slabs.
 - 8. Use Schedule 80 PVC for exterior underground installations.
 - 9. Use RMC or IMC for all exterior aboveground installations.

B. Routing

1. General.
 - a. Install exposed conduits and conduits above suspended ceilings, parallel or perpendicular to walls, ceilings, or structural members.
 - b. Do not run through structural members.
 - c. Avoid horizontal runs within partitions or side walls.
 - d. Avoid ceiling inserts, lights, or ventilation ducts or outlets.
 - e. Do not run conduits across pipe shafts or ventilation duct openings and keep conduits a minimum of 6 inches from parallel runs of flues, hot water pipes, or other sources of heat.
 - f. Wherever possible, install horizontal raceway runs above water and steam piping.
2. Finished Areas. Conceal conduits installed in finished areas of new construction in walls, in slabs, or above suspended ceilings. Conceal new conduits installed in existing finished areas where practical.
3. Other Interior Areas. Where possible, run conduits to motors or equipment more than 3 feet from walls under the slab or floor and stubbed up to the equipment. For all other interior applications, install conduits exposed or concealed as shown.
4. Other Interior Areas. Where possible, run conduits to motors or equipment more than 3 feet from walls under the slab or floor and stubbed up to the equipment. For all other interior applications, conduits shall be exposed.
5. Exterior. Do not run conduits exposed on the exterior surface of buildings.
6. Underground.
 - a. Install underground conduits a minimum of 24 inches below finished grade for circuits 600 volts or less and 36 inches for circuits above 600 volts.
 - b. Concrete encased conduits shall have a minimum of 3 inches of concrete cover for circuits 600 volts and less and 4 inches for circuits above 600 volts.
 - c. Wherever possible, make changes of direction with long sweep bends having a minimum radius of 2.5 feet.
 - d. Slope conduits toward manholes or pull boxes and away from building with a pitch of not less than 3 inches in 100 feet.
 - e. Provide a marker tape over all conduit runs as specified in Section 26 05 53, "Electrical Identification."

C. Penetrations

1. Exterior Walls. Seal conduits penetrating exterior walls of any structure (other than handholes, manholes, or pull boxes) below grade, at grade floors, or below grade floors to prevent moisture migration as specified in Section 26 05 29, "Supporting Devices." As close as practical to the penetration, install a junction box to allow for the installation of the interior conduit seal.
2. Slabs and Floors.
 - a. Where PVC conduits are installed in slabs or floors, the transition from embedded to exposed shall be RMC or IMC.
 - b. The metal conduit shall extend a minimum of 1 inch into the concrete.
 - c. Where PVC conduits are installed below on-grade slabs or floors, the penetration shall be made with RMC or IMC.
3. Fire Rated Walls. Seal conduits penetrating fire rated walls, floors, and partitions with a fire rated sealant as described in Section 26 05 29, "Supporting Devices."
4. Roofs. Conduits shall penetrate roofs only where specifically shown.
5. Finished Walls, Floors, and Ceilings. Where conduits pass through finished walls and ceilings, install escutcheons.

D. Supports.

1. Support all conduits as specified in Section 26 05 29, "Supporting Devices."
2. Support all conduits entering structures as shown.
3. Provide reinforcing for concrete duct banks passing through backfilled area.
4. Reinforcing shall extend a minimum of 5 feet beyond excavation.

E. Fittings.

1. Install miscellaneous fittings such as reducers, chase nipples, three piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application.
2. Use threaded fittings and conduit bodies for RMC and IMC.
3. Install grounding type expansion fittings in raceways every 200 feet of linear run or wherever structural joints are crossed to allow for expansion and contraction.
4. Draw up couplings and conduit sufficiently tight to ensure watertightness.
5. Terminate EMT at all boxes with a connector, locknut, and bushing.
6. Terminate RMC and IMC at NEMA 1 and NEMA 12 boxes with two locknuts, one inside and one outside, and a bushing.

7. Terminate RMC and IMC at NEMA 3R, NEMA 4, and NEMA 4X enclosures and weatherproof equipment enclosures with conduit hub assemblies.

F. **Conduit Seals.**

1. Provide explosionproof conduit seals where required by the NEC.
2. Install approved sealing compound after conductor installation.
3. Follow all manufacturer's installation practices.

3.5 **INSTALLATION - WIREWAYS**

A. **Uses Permitted**

1. Use watertight wireways in damp or wet interior areas and for all exterior areas.
2. Use oiltight wireways in dry process areas.
3. Use general purpose wireways in nonprocess areas.

B. **Routing.** Install wireways parallel or perpendicular to wall, floors, ceilings, or structural members.

C. **Supports.** Support all wireways as specified in Section 26 05 29, "Supporting Devices."

D. **Fittings.** Install fittings that have been specifically designed and manufactured for their particular application.

3.6 **CLEANING.**

A. During construction, protect partially completed raceway runs from entrance of dirt, moisture, and debris by means of suitable factory made duct plugs.

B. After completion of installation, pull a mandrel through every conduit to check for alignment and clear passage.

1. Use an iron shot mandrel with a diameter of 1/4 inch less than the nominal size of the conduit and with a length equal to the conduit diameter.
2. The mandrel shall have a leather or rubber gasket slightly larger than the conduit opening.
3. After testing the conduits with the mandrel, pull a stiff brush through each duct until it is clear of any particles of earth, sand, or gravel, then install plugs until wire is to be pulled.

C. Clean existing ducts to be used for new cable in the same manner as noted above.

END OF SECTION

SECTION 26 05 34

CABINETS, BOXES, AND FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 33, "Raceways."
 - 4. Section 26 05 29, "Supporting Devices."
 - 5. Section 26 05 26, "Grounding."

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish and install cabinets, boxes, and fittings in accordance with the plans and as specified herein.
- B. **Types of cabinets, boxes, and fittings** specified in this section include the following:
 - 1. Outlet and device boxes.
 - 2. Pull and junction boxes.
 - 3. Cabinets.
 - 4. Hinged door enclosures.
 - 5. Boxes for hazardous locations.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to furnish and install cabinets, boxes, and fittings in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
- B. **Nationally Recognized Testing Laboratory (NRTL) Listing and Labeling.** Items provided under this section shall be listed and labeled by an NRTL. The term "NRTL" shall be as defined in Occupational Safety and Health Administration (OSHA) Regulation 1910.7.
- C. **National Electrical Code (NEC) Compliance.** Components and installation shall comply with National Fire Protection Association (NFPA) 70 "National Electrical Code."

- D. **National Electrical Manufacturers Association (NEMA) Compliance.**
Comply with NEMA Standard 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

1.4 **SUBMITTALS**

- A. **General.** Furnish manufacturer's product data, test reports, and material certifications.
- B. **Shop Drawings.** For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Store cabinets, boxes, and fittings** in clean dry space. Protect products from weather, damaging fumes, construction debris, and traffic.

1.7 **SPECIAL WARRANTY**

Not used.

1.8 **DEFINITIONS**

- A. **Cabinets.** An enclosure designed either for surface or for flush mounting having a frame, or trim in which a door or doors may be mounted.
- B. **Device Box.** A box designed to house a receptacle or a switch.
- C. **Enclosure.** A box, case, cabinet, or housing for electrical wiring or components.
- D. **Hinged Door Enclosure.** An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.
- E. **Outlet Box.** A wiring enclosure where current is taken from a wiring system to supply utilization equipment.
- F. **Wiring Box.** An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

PART 2 - PRODUCTS

2.1 **OUTLET, DEVICE, AND WIRING BOXES**

- A. **Metal Outlet, Device, and Wiring Boxes**

1. Conform to UL 541A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
2. Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be flat-rolled code gauge galvanized steel with stamped knockouts, threaded screw holes, and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings, and fixture studs. Device boxes shall be minimum of 3-1/2 inches deep.
3. Provide cast aluminum boxes with threaded raceway entries, and features and accessories suitable for each location including mounting ears, threaded screw holes for devices, and closure plugs. Boxes shall be made from copper free aluminum. Device boxes shall be minimum of 2-1/2 inches deep. Outlet boxes shall be minimum of 1-1/2 inches deep.
4. Provide explosionproof boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.2 PULL AND JUNCTION BOXES

- A. **General.** Comply with UL 50, "Electrical Cabinets and Boxes," for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
- B. **General Purposes Boxes.** Hot-dip galvanized sheet steel with stamped knockouts and with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
- C. **Dusttight and Oiltight Boxes.** Hot-dip galvanized sheet steel without knockouts and with welded seams and oil-resistant gasket. Rated NEMA 12.
- D. **Raintight Boxes.** Painted galvanized steel, drip shield, with stamped knockouts in bottom only. Rated NEMA 3R.
- E. **Weatherproof Boxes.** Type 316 stainless steel, welded seams, without knockouts. Stainless steel hardware, seamless gasket, cover clamps on all four sides. Rated NEMA 4X.
- F. **Cast Aluminum Boxes.** Molded of copper-free aluminum, with gasketed cover and integral threaded conduit entrances.
- G. **Explosionproof Boxes.** Cast metal boxes conforming to UL 886, "Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations," listed and labeled for use in the specific location classification, and with the specific hazardous material encountered. Conduit entrances shall be integral threaded type.

2.3 **HINGED DOOR ENCLOSURES**

- A. **General.** Comply with UL 50, "Cabinets and Enclosures," and NEMA ICS6, "Enclosures for Industrial Control and Systems."
- B. **General Purpose Enclosures.** Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and removable, with 3/4-inch flange around all edges, shaped to cover edge of boxes. Provide three-point handle-operated latch with key lock. Enclosure greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 1 and shall be painted American National Standards Institute (ANSI) 61 gray.
- C. **Dusttight and Oiltight Enclosures.** Constructed of 14-gauge sheet steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable, with 3/4-inch flange around all edges, shaped to cover edge of box. Oil resistant gasket. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted removable internal mounting panel for component installation. Enclosure shall be rated NEMA 12 and shall be painted ANSI 61 gray unless otherwise noted.
- D. **Weatherproof Enclosures.** Constructed of 14-gauge Type 316 stainless steel with continuous welded seams. Doors shall be hinged directly to cabinet and shall be removable. Rolled lip around door and cabinet. Watertight seamless gasket. Stainless steel door clamps. Provide three-point handle-operated latch with key lock. Enclosures greater than 36 inches in width shall have two doors. Provide a painted, removable internal mounting panel for component installation. Enclosure shall be rated NEMA 4X.

2.4 **CABINETS**

- A. **General.** Comply with UL 50, "Electrical Cabinets and Boxes."
- B. **Cabinet shall be constructed of sheet steel,** NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24 inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24 inches apart and not over 6 inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box.
- C. **Provide double doors for cabinets** wider than 24 inches. Telephone cabinets wider than 48 inches may have sliding or removable doors.
- D. **Provide combination spring catch** and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and

lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.5 ACCESSORIES

- A. **Corrosion Inhibitors.** All enclosures containing equipment, terminals, or splices shall have a vapor phase corrosion inhibitor. Provide two spares for each one installed.

2.6 MANUFACTURERS

- A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - 1. Adalet Enclosure Systems.
 - 2. American Electric.
 - 3. Carlon Division of Lamson & Sessions.
 - 4. Crouse Hinds.
 - 5. Erickson Electrical Equipment Co.
 - 6. Hoffman Enclosures.
 - 7. Killark Electric Mfg. Co.
 - 8. O.Z. Gedney.
 - 9. Raco/Bell Division Harvey Hubbell.
 - 10. Spring City Electrical Mfg. Co.
 - 11. Square D Co.
 - 12. Steel City/Thomas & Betts.

PART 3- EXECUTION

3.1 COORDINATION

- A. **Coordinate installation of electrical cabinets,** boxes, and fittings with wire/cable, wiring devices, and raceway installation work.

3.2 INSTALLATION

- A. **Uses Permitted**
 - 1. Outlet Boxes.
 - a. Use galvanized flat rolled sheet steel boxes in finished areas with framed construction
 - b. Use nonmetallic boxes in corrosive areas as designated on the plans.
 - c. Use explosionproof boxes in hazardous areas as designated on the plans.
 - d. Use cast metal boxes in all other locations. Each box with associated covers and fittings shall have a NEMA rating suitable for each location installed.

2. Pull and Junction Boxes.
 - a. Use general purpose boxes in finished areas with framed construction.
 - b. Use dusttight and oiltight boxes in other dry interior areas.
 - c. Use explosionproof boxes in hazardous areas as designated on the plans.
 - d. Use weatherproof boxes for all other locations.
3. Hinged Door Enclosures.
 - a. Use dusttight and oiltight enclosures to house electrical equipment and controls in dry interior locations.
 - b. Use weatherproof enclosures to house electrical equipment and controls in all other locations.
4. Cabinets.
 - a. Install enclosures and associated materials and NEMA types suitable for each location and in conformance with the drawings.

B. General

1. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
2. Support and fasten items securely in accordance with Section 26 05 29, "Supporting Devices."
3. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than size indicated.
4. Remove sharp edges where they may come in contact with wiring or personnel.
5. Install boxes in locations which ensure ready accessibility to enclosed electrical wiring and avoid installing boxes back to back in walls where there would be less than 6 inches (150 millimeters [mm]) separation. Fasten boxes firmly and rigidly to substrates or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. Aluminum boxes in contact with reinforced concrete shall be isolated by a bitumastic coating.
6. Provide electrical connections for installed boxes.

C. Outlet, Device, and Wiring Boxes

1. For outlets at windows and doors, locate close to window trim. For outlets indicated above doors, refer to plans for mounting height above finished floor and center outlets above the door opening except as otherwise indicated.
2. For column and pilaster locations, locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions.
3. For outlet boxes for locations in special finish materials for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone, or wood walls, use rectangular

shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

4. Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side.
5. For outlet locations on exterior face of exterior walls, all outlet boxes shall be recessed in the wall.
6. For cover plates for surface boxes, use plates sized to box front without overlap.
7. Protect outlet boxes to prevent entrance of plaster and debris.

D. Pull and Junction Boxes

1. Install clamps, grips, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inches inside boxes.
2. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
3. Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 314 of NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.

E. Cabinets and Hinged Door Enclosures

1. Mount with fronts straight and plumb.
2. Install with tops 78 inches above floor.
3. Set cabinets in finished spaces flush with walls.
4. Use spacers to maintain 1/4-inch clearance from wall.

3.3 GROUNDING

- A. **Electrically ground metallic cabinets**, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box, or enclosure.

3.4 CLEANING AND FINISH REPAIR

- A. **Upon completion of installation** and before devices and wiring are installed, remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions, and weld marks.
- B. **For galvanized finish**, repair damage using a zinc-rich paint recommended by the manufacturer.

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- C. **For painted finish**, repair damage using matching corrosion-inhibiting touch-up coating.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK**
 - A. **General.** Provide the labor, tools, equipment, and materials necessary to perform the work in accordance with the plans and specifications.
 - B. **This section includes identification** of electrical materials, equipment, and installations. It includes requirements for electrical identification components including, but not limited to, the following:
 1. Buried electrical line warnings.
 2. Identification labeling for raceways, cables, and conductors.
 3. Operational instruction signs.
 4. Warning and caution signs.
 5. Equipment labels and signs.
- 1.3 **QUALITY ASSURANCE**
 - A. **National Electrical Code.** Provide warning signs where required by National Fire Protection Association (NFPA) 70 “National Electrical Code (NEC).”
 - B. **American National Standards Institute (ANSI) Compliance.** Comply with requirements of ANSI Standard A13.1, “Scheme for the Identification of Piping Systems,” with regard to type and size of lettering for raceway and cable labels.
- 1.4 **SUBMITTALS.** Submit the following package in accordance with Division 1 and this specification section.
 - A. **Submittal Package No. 1 – Product Data and Test Reports**
 1. Furnish manufacturer's product data, test reports, and materials certifications as required.
- 1.5 **JOB CONDITIONS** (Not used)
- 1.6 **DELIVERY, STORAGE, AND HANDLING** (Not used)
- 1.7 **SPECIAL WARRANTY** (Not used)

PART 2 - PRODUCTS

2.1 MATERIALS

A. Box, Conduit, and Raceway Identification

1. Adhesive Labels. Preprinted, flexible, self-adhesive vinyl labels with black legend. Legend covered with clear weather and chemical resistant coating.
2. Plastic Sleeves. Preprinted, pretensioned, snap-on, flexible, wraparound plastic sleeves with black legend. Sized to fit conduit diameter.
3. Plasticized Card Stock Tags. Vinyl cloth with preprinted and field printed legends. Red background, except as otherwise indicated, with eyelet for fastener.
4. Buried Electrical Line Warning Tape. Permanent, bright colored (red), continuous printed, plastic warning tape not less than 6 inches wide by 5 mils thick with continuous metallic strip or core. Printed legend reading as follows: "Buried High Voltage Line Below."

B. Wire and Cable Identification

1. Colored Marking Tape. Self-adhesive vinyl tape not less than 7 mils thick and 3/4 inch wide.
2. Wire Labels. Self-adhesive wraparound labels with clear heat shrinkable jacket or permanent plastic heat shrinkable labels. Preprinted legends.
3. Aluminum Face Card Stock Tags. Weather resistant, 18 point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch thick, and laminated with moisture resistant acrylic adhesive. Preprint legend to suit the application and punch for tie fastener.
4. Aluminum Wraparound Marker Bands. Bands with stamped or embossed legend and slots or ears for permanently securing around wires, cables, or groups of wires. Four millimeter (mm) thick sheet aluminum.

C. Nameplates and Signs

1. Laminated Plastic. Engraving stock plastic laminate, 1/16 inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Engrave legend in black letters on white face unless otherwise noted and punched for mechanical fasteners.
2. Metal Backed Butyrate. Weather-resistant, nonfading, preprinted cellulose acetate butyrate signs with 20-gauge, galvanized steel backing, with colors, legend, and size appropriate to the location. Provide 1/4-inch grommets in corners for mounting.
3. Brass or Aluminum Tags. Metal tags with stamped legend, punched for fasteners. Dimensions: 2 inches by 2 inches by 19 gauge.

D. **Accessories**

1. Fasteners. Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.
2. Cable Ties. Fungus inert, self-extinguishing, one piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-pound minimum tensile strength, and suitable for a temperature range from minus 40 degrees Fahrenheit (° F.) to 185° F. Provide ties in specified colors when used for color coding.

2.2 **MANUFACTURERS**

A. **Available Manufacturers.** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:

1. American Labelmark Co.; Labelmaster Subsidiary
2. Brady Corp.
3. Carlton Industries, Inc.
4. Champion American, Inc.
5. Emed Co., Inc.
6. Grimco, Inc.
7. Ideal Industries, Inc.
8. Kraftbilt.
9. LEM Products, Inc.
10. Markal Corp.
11. National Band and Tag Co.
12. Panduit Corp.
13. Radar Engineers.
14. Seton Identification Products
15. Standard Signs, Inc.

PART 3 - EXECUTION

3.1 **APPLICATIONS**

A. **Conduits**

1. Underground Lines. Identify with warning tape in trench above conduits.

B. **Boxes**

1. Code Required Caution Signs. Self-adhesive labels indicating system voltage. Install on outside of box cover.
2. Circuit Identification. Self-adhesive labels indicating contained circuits.

C. **Wires and Cables**

1. Color Coding. Color code service, feeder, and branch circuit conductors as follows:

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| 208/120 Volts | Phase | 480/277 Volts |
|---------------|---------|---------------|
| Black | A | Brown |
| Red | B | Orange* |
| Blue | C | Yellow |
| White | Neutral | White |
| Green | Ground | Green |

*Where not permitted by inspecting authority, use purple.

- a. Use conductors with color factory applied for sizes No. 8 AWG and smaller.
 - b. Use colored marking tape for sizes larger than No. 8 AWG. Apply for a distance of 6 inches from terminal points and in boxes where splices or taps are made.
2. Circuit Identification. Use aluminum wraparound marker bands to identify feeders and branch circuits in manholes, handholes, and pull boxes.
3. Conductor Labeling. Use wire labels to identify conductors as follows:
- a. Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
 - b. Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three circuit, four wire home runs), label each conductor or cable.
 - c. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring.
 - d. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation.
 - e. For control and communications/signal wiring, use color coding for wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets.
 - f. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
 - g. Match identification markings with designations used in panelboards, shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
 - h. Provide securely attached nameplates identifying all ground buses.
 - i. Provide securely attached nametags to each accessible termination, attachment, or bonding location for each equipment grounding conductor, grounding electrode conductor, and bonding conductor.

D. **Signs**

1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to ensure safe operation and maintenance of electrical systems and of the items to which they connect.
2. Install engraved plastic laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation.
3. Install butyrate signs with metal backing for outdoor items.
4. For emergency operating signs, install engraved laminate signs with white legend on red background with minimum 3/8 inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.
5. Provide code required signs for multiple main switches, for standby power systems, and, where required, for generator ground connection.

E. **Nameplates**

1. General.
 - a. Provide equipment identification nameplates for each major unit of electrical equipment, including central or master units of each electrical system.
 - b. This includes communication/signal/alarm systems unless unit is specified with its own self-explanatory identification.
 - c. Text shall match terminology and numbering of the contract documents and shop drawings.
2. Provide 1-1/2-inch high engraved plastic laminated nameplates (2 inches high where two lines of text are required) with 1/2-inch lettering for the following:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealed electrical items.
 - c. Switchgear and switchboards.
 - d. Substations.
 - e. Motor control centers.
 - f. Motor starters.
 - g. Contactors.
 - h. Enclosed circuit breakers.
 - i. Disconnect switches.
 - j. Control panels.
3. Provide 5/8-inch-high engraved plastic laminated nameplates (1-inch high where two lines of text are required) with 1/4-inch high lettering for individual compartments of the following:
 - a. Switchgear and switchboards.
 - b. Motor control centers.

4. Provide 5/8-inch-high engraved plastic laminated namplates (1-inch high where two lines of text are required) with 1/4-inch high lettering for the following:
 - a. Push-button stations.
 - b. Remote controlled switches.
 - c. Control devices.
 - d. Light switches.
5. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment. All code requirements for signage shall be met.

3.2 INSTALLATION

A. General

1. Lettering and Graphics. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
2. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC. Clean surfaces of dust, loose material, and oily films before applying.
3. Sequence of Work. Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
4. Install labels where indicated or at locations for best viewing without interference with operation and maintenance of equipment.

B. Buried Line Warning Tape.

1. During trench backfilling, for exterior underground power, control, signal, and communications cables and conduits, install continuous underground plastic line marker, located directly above line at 6 to 8 inches below finished grade.
2. Where multiple lines are installed in a common trench or concrete envelope, do not exceed an overall width of 16 inches; install a single line marker.

C. Tape.

1. Apply colored, pressure-sensitive plastic tape in half-lapped turns.
2. Apply the last two turns of tape with no tension to prevent possible unwinding.
3. Do not obliterate cable identification markings by taping.
4. Tape locations may be adjusted slightly to prevent such obliteration.

D. Metal Tags. Attach metal tags with one piece self-locking nylon cable ties.

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- E. **Cable Ties.** Apply cable ties with a special tool or pliers; tighten for snug fit and cut off excess length.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 53, "Electrical Identification," for requirements for legends to be engraved on wall plates.
 - 4. Section 26 28 16, "Circuit and Motor Disconnects," for devices other than snap switches and plug/receptacle sets used as disconnects for motors.

1.2 DESCRIPTION OF WORK

- A. **General.** Provide the labor, tools, equipment, and materials necessary to furnish and install wiring devices in accordance with the plans and as specified herein.
 - 1. This section includes the following:
 - a. Receptacles.
 - b. Ground fault circuit interrupter (GFCI) receptacles.
 - c. Plugs.
 - d. Plug connectors.
 - e. Snap switches.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work to furnish and install wiring devices in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
 - 1. Regulatory Requirements. Comply with provisions of the following codes.
 - 2. National Fire Protection Association (NFPA) 70, "National Electrical Code (NEC)."
 - 3. Underwriters' Laboratories, Inc. (UL) and National Electrical Manufacturers Association (NEMA) Compliance. Provide wiring devices which are listed and labeled by UL and comply with applicable UL and NEMA standards.

1.4 **SUBMITTALS**

- A. **Transmittals.** Furnish manufacturer's product data, test reports, and materials certifications as required.
- B. **Submit the following** in accordance with Conditions of Contract and Division 1 specifications sections:
 - 1. Product data for each type of product specified.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Deliver wiring devices and components** properly packaged in factory fabricated type containers.
- B. **Store wiring devices and components** in original packaging and in a clean, dry space; protect from weather and construction traffic.
- C. **Handle wiring devices and components** carefully to avoid breakages, impacts, denting, and scouring finishes. Do not install damaged equipment; replace/return damaged units to equipment manufacturer.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- A. **Manufacturers**
 - 1. Manufacturers. Subject to compliance with requirements, provide products by one of the following:
 - a. Wiring Devices.
 - 1) Bryant Electric Co.
 - 2) Hubbell, Inc.
 - 3) Pass & Seymour/Legrand.
 - 4) Leviton.
- B. **Wiring Devices**
 - 1. General. Provide wiring devices, in types, characteristics, grades, colors, and electrical ratings for applications indicated which are UL listed and which comply with NEMA WD 1 and other applicable UL and

NEMA standards. Provide ivory color devices and wall plates except as otherwise indicated. Verify color selections with Engineer/Architect.

2. Receptacles.
 - a. Comply with UL 498 and NEMA WD 1.
 - b. Ground Fault Interrupter (GFI) Receptacles. Provide "feed through" type ground fault circuit interrupter, with integral heavy duty NEMA 5-20R duplex receptacles arranged to protect connected downstream receptacles on same circuit. Provide unit designed for installation in a 2 3/4 inch deep outlet box without adapter, grounding type, Class A, Group 1, per UL Standard 943.
3. Switches.
 - a. Snap Switches. Quiet-type alternating current (ac) switches. Comply with Federal Specification (FS) W-S-896, UL 20, and NEMA WD1.
4. Heavy-Duty Weatherproof/Explosionproof Snap Switches. Provide factory-sealed snap switches suitable for Class 1, Division 1 and 2, Group C and D and NEMA 3 locations. Provide conduit hub sizes, poles, and multiple gangs as shown on the contract documents. Switches shall be Crouse-Hinds Model EDS, or equal.

C. Wiring Device Accessories

1. Weatherproof GFCI Receptacle Covers. Weatherproof covers for GFCI receptacles shall be rainproof while in use and shall be in full compliance with NEC Article 406.8. The covers shall be constructed of clear polycarbonate. The covers shall be hinged allowing them to swing open and closed. Provide molded polycarbonate inserts to plug unused cord openings in the cover and stainless steel mounting hardware. Provide standard box or FS box mounting provisions as necessary.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of Wiring Devices and Accessories

1. Install wiring devices and accessories as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, and in accordance with recognized industry practices to fulfill project requirements.
2. Coordinate with other work, including painting, electrical boxes, and wiring installations, as necessary to interface installation of wiring devices with other work.
3. Mount all wall switches at 4'-0" above finished floor and all receptacles at 1'-6" above the finished floor unless otherwise noted.

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4. Install wiring devices only in electrical boxes which are clean, free from building materials, dirt, and debris.
5. Install wiring devices after wiring work is completed.
6. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A. Use properly scaled torque-indicating hand tool.

3.2 PROTECTION

- A. **General.** Protect installed components from damage. Replace damaged items prior to final acceptance.

3.3 FIELD QUALITY CONTROL

- A. **Testing.** Prior to energizing circuits, test wiring for electrical continuity, and for short circuits. Ensure that proper polarity of connections is maintained. Subsequent to energizing, test wiring devices and demonstrate compliance with requirements, operating each operable device at least six times.
 1. Test ground fault interruptor operation with both local and remote fault simulations in accordance with manufacturer recommendations.

END OF SECTION

SECTION 26 28 16

CIRCUIT AND MOTOR DISCONNECTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- B. **Related Sections.** The following sections contain requirements that relate to this section:
 - 1. Section 26 00 01, "Basic Electrical Requirements."
 - 2. Section 26 00 02, "Basic Electrical Materials and Methods."
 - 3. Section 26 05 12, "Wires, Cables, and Connectors."
 - 4. Section 26 05 33, "Raceway."
 - 5. Section 26 05 34, "Cabinets, Boxes, and Fittings."

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and material necessary to install circuit and motor disconnects in accordance with the plans and as specified herein.
- B. **Extent of circuit and motor disconnect** switch work is indicated by drawings and schedules.
- C. **Types of circuit and motor disconnect** switches in this section include the following:
 - 1. Equipment disconnects.
 - 2. Motor circuit disconnects.

1.3 QUALITY ASSURANCE

- A. **Codes and Standards.** Perform all work associated with circuit and motor disconnects in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
 - 1. National Electrical Code (NEC) Compliance. Comply with NEC requirements pertaining to construction and installation of electrical circuit and motor disconnect devices.
 - 2. Underwriters' Laboratories, Inc. (UL) Compliance. Comply with requirements of UL 98 "Enclosed and Dead Front Switches." Provide circuit and motor disconnect switches which have been UL listed and labeled.
 - 3. National Electrical Manufacturers Association (NEMA) Compliance. Comply with applicable requirements of NEMA Standards Pub. Nos. KS 1, "Enclosed and Miscellaneous Distribution Equipment Switches

(600 Volts Maximum)," and 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)."

1.4 **SUBMITTALS**

- A. **General.** Submit manufacturer's product data, test reports, and material certifications.

1.5 **JOB CONDITIONS**

Not used.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Deliver circuit and motor disconnect** switches properly packaged in factory-fabricated-type containers or wrappings which properly protect devices from damage.
- B. **Store circuit and motor disconnect** switches in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. **Handle circuit and motor disconnect** switches carefully to prevent physical damage. Do not install damaged disconnect switches; remove from site and replace damaged devices with new.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **MATERIALS**

- A. **Heavy-Duty Safety Switches.** Provide surface-mounted, heavy-duty-type, sheet steel enclosed safety switches, of types, sizes, and electrical characteristics as required for the indicated installation; fused, if noted on plan. Provide switches incorporating quick make, quick break type switches, so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable and is padlockable in OFF position. Interlock enclosure door with operating handle such that the door cannot be opened with the switch closed. Provide an inconspicuous defect mechanism for use by maintenance personnel. Construct current carrying parts of high conductivity copper with silver tungsten type switch contacts; and positive pressure type reinforced fuse clips where fusible switches are specified or required by code. Provide NEMA Type 12 enclosures. For switches marked "WP," provide NEMA Type 4X stainless steel enclosures.

2.2 **MANUFACTURERS**

- A. **Manufacturer.** Subject to compliance with requirements, provide circuit and motor disconnects of one of the following (for each type of switch):
 - 1. Crouse-Hinds Co.
 - 2. Cutler-Hammer, Inc.
 - 3. General Electric Co.
 - 4. Square D Company.

PART 3 - EXECUTION

3.1 **INSTALLATION**

- A. **Install circuit and motor disconnect** switches as indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and National Electrical Contractor's Association (NECA) "Standard of Installation," and in accordance with recognized industry practices.
- B. **Coordinate circuit and motor disconnect** switch installation work with electrical raceway and cable work, as necessary for proper interface.
- C. **Locations of disconnect switches** as shown on the plans are approximate unless dimensioned. Install disconnect switches as close to the equipment served as practical, but at a readily accessible location with adequate working clearances to meet all NEC requirements.
- D. **Provide a suitable means** for mounting all disconnect switches.

3.2 **GROUNDING**

- A. **Provide equipment grounding connections**, tightened to ensure a permanent and effective ground, for all electrical disconnect switches.

3.3 **FIELD QUALITY CONTROL**

- A. **Subsequent to completion of installation** of electrical disconnect switches, energize circuitry and demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest. Corrective action and repeated tests shall be accomplished at own expense.

END OF SECTION

SECTION 33 05 01

CONNECTIONS TO EXISTING MAINS AND SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to accomplish connections to pipelines and sewers in service in accordance with the plans and as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all work in compliance with all federal, state, and local codes and regulatory agencies.

1.4 SUBMITTALS

Not used.

1.5 JOB CONDITIONS

- A. **Notification.** Notify the Owner at least 2 working days in advance and all affected users at least 24 hours in advance of shutoffs. The notification shall include planned starting time and duration of interruption in service. The time and duration of interruption of service must be approved by the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

Not used.

1.7 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 CONNECTING TO EXISTING UTILITIES AND STRUCTURES

A. Examination

1. Verification of Conditions. Verify the location and elevation of required construction. Confirm that conditions are acceptable to begin construction of work covered in the specification. Complete coordination with other construction or operation activity on the same facility or area. Expose all existing pipes within the work area to permit confirmation of pipe sizes, all required dimensions, elevations, precise locations, and materials of construction prior to ordering new materials and not less than 7 working days prior to date planned for actual connection.

B. Main Connection

1. Sequence of Work.
 - a. Complete as much work as possible before making connections. New mains must be blocked, tested, sterilized, and approved prior to connecting to existing mains.
 - b. Coordinate the work so that all labor, materials, tools, and equipment are on the site at the start of the work.
 - c. Work continuously (24 hours per day, 7 days per week) until service is restored.
 - d. Schedule the work to correspond with minimum flows, such as nights and weekends, to minimize inconvenience to customers.
2. Disinfection. Disinfect contaminated potable water pipe in accordance with Section 01 89 19, "Leakage Test and Disinfection."
3. Testing. Test the connection before backfilling.
4. Refilling. Refill the pipe from the system and evacuate all air through hydrants and air releases.
5. Demonstration. Comply with requirements of Section 33 05 30 Item 3.6.

C. Sewer Connection

1. Description. Provide for intercepting existing sewers and connecting new sewers to existing manholes where shown on the plans or where directed and as specified herein.
2. General. This work shall include neatly cutting out existing sewers within new manholes; abandoning sewers within new and existing manholes and plugging with concrete; connecting into and reshaping inverts within existing manholes to accommodate new sewers; and

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temporarily plugging new sewers within existing manholes. All plugs and connections shall be made watertight.

END OF SECTION

SECTION 33 05 30

PRESSURE PIPE, FITTINGS, AND VALVES, INSTALLATION

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK**
- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to install the pipe and fittings in accordance with the drawings and specifications. The work includes, but is not limited to, the following:
1. Excavation, preparation of the trench bottom and bedding.
 2. Shoring and bracing.
 3. Piping beginning at the outside face of structures or building foundations, unless specifically included under other sections.
 4. Piping beneath structures.
 5. Installation of supports, restraints, and thrust blocks.
 6. Work on existing buried pipelines.
 7. Installation of all joints, fittings, specials, couplings, adapters, sleeves, tie rods, jointing and gasketing materials, and all other work required to complete the piping installation.
 8. Valves, gates, and specials shown or specified for the piping systems.
 9. Testing and disinfection.
 10. Cleaning.
 11. Trench maintenance.
- 1.3 **QUALITY ASSURANCE**
- A. **Standards.** Conform all materials and workmanship with the following standards.
1. AASHTO – American Association of State Highway and Transportation Officials.
 2. ANSI – American National Standards Institute.
 3. ASTM – American Society for Testing and Materials.
 4. AWWA – American Water Works Association.
 5. PPI – Plastic Pipe Institute.
- B. **Trench Maintenance.** Be responsible for the condition of the trenches for a minimum period of year from the date of the final acceptance, which must include the period of November 1 to the following April 30. Extend the contract bond to cover the entire trench maintenance period.
- 1.4 **SUBMITTALS.** Submit all submittals in accordance with the Division 1 Submittal Requirements and this specification section.

A. **Submittal Package No. 1 – Backfill Product Data**

1. Product data noting each material source, location, sieve analysis, and other information which will show that the source and supplier are capable of furnishing materials meeting the requirements of these specifications. Include name and location of all borrow pits. Product data is required for the following:
 - a. Granular pipe bedding.
 - b. Granular backfill.

1.5 **JOB CONDITIONS.** Provide all water required for testing, cleaning, and flushing at no additional cost to the Owner. Do not pressure-test polyvinyl chloride (PVC) and polyethylene (PE) pipe when the temperature of the pipe is over 80 degrees Fahrenheit (° F.).

1.6 **DELIVERY, STORAGE, AND HANDLING**

A. **General**

1. Delivery, storage, and handling shall be in accordance with Section 01 60 00, "Materials and Equipment."
2. Reject pipe, fittings, and accessories that are cracked, damaged, or in poor condition, or have damaged linings.
3. Pipe handled on skidways shall not be skidded or rolled against other pipe.
4. Protect PVC or PE pipe from exposure to heat or direct sunlight (ultraviolet rays).

1.7 **SPECIAL WARRANTY** (Not used)

PART 2 - PRODUCTS

2.1 **GENERAL**

A. **Pipe and Fittings.** Conform all buried piping, fittings, and joints to the drawings and requirements specified in the corresponding section for each type of pipe installed.

B. **Manufacturer**

1. All new buried piping of one material shall be by a single manufacturer.
2. All buried fittings of one material shall be by a single manufacturer.
3. All pipe and fittings manufactured outside the United States shall be certified to ISO 9001:2000 standards for quality assurance.

C. **Identification**

1. Factory-mark or cast all pipe and fittings 4 inches in diameter and larger with the pipe size, material, and class or schedule on the exterior pipe surface.
2. Factory-mark all piping less than 4 inches in diameter with the pipe size, material, and class or schedule on the exterior pipe surface.

2.2 **BACKFILL**

A. **Granular Pipe Bedding.**

1. Crushed stone or gravel meeting the following requirements:

| Nominal Pipe Size | AASHTO M43 Size |
|-------------------|-----------------|
| Less than 16 " | 7, 78, 8, or 89 |
| Greater than 16" | 6, 67, or 68 |

2. Maximum loss during an AASHTO T104 5-cycle sulfate soundness test shall be 15 percent.
3. Maximum wear during an AASHTO T-96 Los Angeles abrasion test shall be 50 percent.

B. **Selected Excavated Trench Material.** Free from cinders, refuse, organic material, boulders, rocks, frozen material, or other material which in the opinion of the Engineer is unsuitable.

C. **Plastic Pipe Backfill.** In addition to the specified material and installation requirements noted elsewhere in this specification, the particle size of material in contact with the plastic pipe shall not exceed the following: ½ in for pipe under 4 inches in diameter, ¾ inches for pipes between 6 to 8 inches in diameter, 1 inch for pipes 10 to 16 inches in diameter; and 1 ½ inches for larger pipes.

D. **Excavated Trench Material.** Free from frozen earth, debris, or earth with an exceptionally high void content.

E. **Granular Backfill.**

1. Granular backfill materials shall be gravel, crushed gravel, crushed stone, or sand meeting the following grading requirements:

| Sieve | Total Percent Passing |
|----------------------|-----------------------|
| 2-1/2 inch | 100 |
| 1 inch | 70 – 100 |
| No. 4 (3/16 inch) | 25 – 100 |
| No. 40 | 10 – 50 |
| No. 200 | 5 – 15 |

2. The fraction passing a No. 40 sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than 6.
3. Maximum loss during an AASHTO T104 5-cycle sulfate soundness test shall be 15 percent.
4. Maximum wear during an AASHTO T-96 Los Angeles abrasion test shall be 50 percent.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verification of Conditions

1. Verify the location and elevation of required construction.
2. Confirm that conditions are acceptable to begin construction of the work covered in the specification.
3. Coordinate with other construction or activities in the same facility or area.

B. Safety. For the security and safety of persons in and adjacent to trenches or construction operations, follow the safety regulations of the appropriate federal, state, and local agency.

C. Dewatering

1. Should water be encountered, furnish and operate suitable pumping equipment of adequate capacity to dewater the trench.
2. Sufficiently dewater the trench so that the laying and joining of the pipe is in the dry.
3. Convey all trench water in accordance with the requirements contained in the National Pollutant Discharge Elimination System (NPDES) program.
4. Convey all trench water to a natural drainage channel or storm sewer without causing any property damage.

D. Construction Equipment. Where mains are located in or adjacent to pavements, all backfilling and materials handling equipment shall have rubber tires. Use crawler equipment only where there is no danger of damaging pavement.

E. Noise, Dust, and Odor Control. Conduct construction activities so as to eliminate all unnecessary noise, dust, and odors. Do not use oil or other materials for dust control which may cause tracking.

3.2 INSTALLATION

A. Protection of Trees

1. Take special care to avoid damage to trees and their root systems.
2. Do not use machine excavation when, in the opinion of the Engineer/Architect, it would endanger the tree.
3. Where the line of trench falls within the limits of the limb spread, headers are required across the trench to protect the tree.

4. Conduct the operation of all equipment (particularly when employing booms), the storage of materials, and the deposition of excavation in a manner which will not injure trees, trunks, branches, or their roots unless such trees are designated for removal.

B. Excavation and Construction Materials.

1. Place all excavated material and all construction materials used in the work so as not to endanger the work, annoy the public, or interfere with natural drainage courses.
2. During the process of the work, maintain all material piles in a neat, workmanlike manner.

C. Trench Support

1. Unsupported open cut trenches will not be permitted where they may cause unnecessary damage to pavement, trees, structures, poles, utilities, or other private or public property.
2. During the progress of the work, support the sides of the excavation by adequate and suitable sheeting, shoring, bracing, or other approved means.
3. Remove trench support material and equipment when backfilling operations have progressed to the point where they may be withdrawn without endangering property.
4. In lieu of removing all the sheeting, you may cut off the sheeting 2 feet above the top of the pipe and remove the upper portion.
5. If all the sheeting is to be removed, remove it without causing damage to the pipe.
6. No sheeting, shoring, or bracing will be paid for by the Owner unless remaining in place on written order of the Engineer/Architect. In this case, payment will be made in accordance with the General Conditions.

D. Trench Excavation and Bottom Preparation

1. Trench Width. Hold widths of trenches to a minimum to accommodate the pipe and appurtenances. Measure the trench width at the top of the pipe barrel and shall conform to the following limits:
 - a. Pipe.

Earth

| | |
|---------|---|
| Minimum | Outside diameter of the pipe barrel plus 8 inches, i.e., 4 inches each side |
| Maximum | Nominal pipe diameter plus 24 inches |

Rock

| | Nominal Pipe Diameter 24 inches or less | Nominal Pipe Diameter Larger than 24 inches |
|---------|--|--|
| Minimum | Outside diameter of the pipe barrel plus 12 inches, i.e., 6 inches each side | Outside diameter of the pipe barrel plus 18 inches, i.e., 9 inches each side |
| Maximum | Nominal pipe diameter plus 24 inches | Nominal pipe diameter plus 24 inches |

- b. Structures. The minimum excavation limits for structures shall be as excavated. In rock, the excavation limits shall not exceed 12 inches from the outside wall and 6 inches below the footer.
- c. Excessive Trench Width. If for any reason the trench width exceeds the maximum trench width defined in this section, provide granular pipe bedding, additional strength pipe, or concrete encasement, at no cost to the Owner and subject to acceptance.

2. Trench Depth.

a. Earth.

- 1) Excavate the trench to the depth required.
- 2) Provide a uniform and continuous bearing and support for the pipe barrel on solid and undisturbed ground at every point between joints.
- 3) It will be permissible to disturb the finished trench bottom over a maximum length of 18 inches near the middle of each length of pipe for the withdrawal of lifting tackle.
- 4) Provide bell holes.
- 5) Accurately prepare the finished trench bottom by means of hand tools.

b. Rock.

- 1) Where excavation is made in rock or boulders, excavate the trench 6 inches below the pipe barrel for pipe 24 inches in diameter or less, and 9 inches for pipe larger than 24 inches in diameter.
- 2) Remove all loose material from the trench bottom.

3. Rock Excavation.
 - a. Rock excavation is defined as the removal of:
 - 1) Unanticipated solid concrete (excluding pavements), unanticipated solid masonry, or boulders each of which has a volume greater than 1 cubic yard.
 - 2) Bedrock which requires for its removal drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool.
 - b. Rock excavation is not excavating:
 - 1) Existing concrete or masonry structures or pavements shown.
 - 2) Material which can be excavated using an appropriately sized, heavy-duty, power-operated excavator, backhoe, or shovel, all of which are equipped with bucket-mounted ripping teeth.
 - 3) Material that can be excavated with a hand pick and shovel.
 - 4) Soft or disintegrated bedrock such as weathered shale, clay shale, claystone, or mudstone, or overconsolidated soils such as "hardpan."
 - 5) Previously blasted materials or materials that are intermittently drilled and blasted to merely increase production.
 - c. Blasting Rock. Do not blast rock unless approved.

E. Pipe, Fittings, and Valve Installation

1. Pipe Laying.
 - a. Lay pipe with bell ends facing in the direction of laying, unless otherwise directed.
 - b. After placing a length of pipe in the trench, center the spigot end in the bell and force the pipe home.
 - c. Lay all pipe with ends abutting and true to line and grade.
 - d. Deflection of pipe joints in excess of the manufacturer's recommendations will not be permitted.
 - e. Provide a watertight pipe plug or bulkhead to prevent the entrance of foreign material whenever pipe laying operations are not in progress.
 - f. Inspect cast metal pipe and fittings for cracks by ringing the pipe with a light hammer while it is suspended.
2. Pipe Cutting.
 - a. Cut pipe in a neat and workmanlike manner without damage to the pipe or lining.

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- b. The end shall be smooth and at right angles to the axis of the pipe.
 - c. Flame cutting of metal pipe by means of an oxyacetylene torch will not be permitted.
3. Push-On Joints.
- a. Thoroughly clean the surfaces with which the rubber gasket comes in contact just before assembly.
 - b. Then insert the gasket into the groove in the bell.
 - c. Before starting joint assembly, apply a liberal coating of special lubricant to the spigot end.
 - d. With the spigot end centered in the bell, push the spigot end home.
4. Mechanical Joints.
- a. Center the spigot in the bell.
 - b. Thoroughly clean the surface with which the rubber gasket comes in contact just before assembly.
 - c. Brush these clean surfaces with a special lubricant just before slipping the gasket over the spigot end and into the bell.
 - d. Also brush the lubricant over the gasket before installation to remove the loose dirt and lubricate the gasket as it is forced into its retaining space.
5. Restrained Joints.
- a. Ball and Socket or Push-On. Assemble and install the ball and socket joint according to the manufacturer's recommendations. Thoroughly clean and lubricate the joint. Check the retainer ring fastener.
6. Joints between Dissimilar Pipe Materials. Make connections to pipe of different materials with adaptors designed to join those materials.
7. Setting Valves.
- a. Set valves on a firm foundation so that no load will be transferred to the connecting pipe.
 - b. Provide a valve box for every buried valve.
 - c. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve.
 - d. Set the box cover flush with the surface of the finished pavement unless otherwise shown.
8. Anchoring. Provide all plugs, caps, tees, and bends with a concrete backing. If shown or specified, prevent movement by attaching suitable metal rods, clamps, or restrained fittings.

- a. Concrete Backing.
 - 1) Concrete backing shall be Design Mix A concrete as specified in Section 03 30 00, "Cast-In-Place Concrete."
 - 2) Place backing between undisturbed ground and the fitting to be anchored.
 - 3) The area of bearing on the fitting and on the ground shall be as shown.
 - 4) Place the backing, unless otherwise shown, so that the pipe and fitting joints will be accessible for repair.
 - b. Tie Rods.
 - 1) Place steel tie rods or clamps, where permitted, of adequate strength to prevent movement.
 - 2) Paint steel tie rods or clamps with three coats of an approved bituminous paint or coal tar enamel.
 - c. Restrained Fittings. Restrained fittings shall be subject to the acceptance of the Engineer/Architect.
- F. **Trench Backfill.** Backfill all trench excavations immediately after pipe is laid as shown and specified.
- 1. Foundation.
 - a. Build the mains on a good foundation.
 - b. If, in the Engineer/Architect's opinion, the material forming the trench bottom is not suitable for a good foundation, replace it with granular pipe bedding as directed.
 - c. Authorized excavation and restoration of the foundation below the trench bottom will be paid for in accordance with the General Conditions.
 - d. Fill unauthorized excavation below the trench bottom with pipe bedding at no cost to the Owner.
 - 2. Pipe Bedding.
 - a. Install all plastic or fiberglass-reinforced plastic (FRP) pipes with a 6-inch-deep granular pipe bed.
 - b. Install all other pipe materials with no pipe bed unless foundation is rock.
 - c. For rock foundations, provide a 6-inch granular pipe bed between rock and pipe for pipes 24 inches in diameter or less and a 9-inch granular pipe bed for pipes larger than 24 inches in diameter.
 - d. Spread granular pipe bedding the full width of trench bottom.

3. Haunching.
 - a. Use compacted selected excavated trench material unless noted otherwise.
 - b. Place in uniform 6-inch loose layers and compact each layer to eliminate the possibility of settlement, pipe misalignment, or damage to joints.
4. Initial Backfill.
 - a. Use selected excavated trench material unless noted otherwise.
 - b. Take care to avoid injuring or moving the pipe.
5. Final Backfill.
 - a. Use excavated trench material unless noted otherwise.
 - b. Use mechanical equipment to place the backfill.
 - c. Do this in such a manner that the material does not free fall, but so that it will flow onto the previously placed material.
 - d. Consolidate the backfill to ensure the minimum possible settlement.
 - e. No compacting of the backfill with mechanical equipment, such as wheeled vehicles, will be permitted unless sufficient cover is provided over the pipe to prevent damage to the pipe.
6. Granular Backfill. When backfilling under pavements, driveways, or as directed, use granular backfill in place of the selected excavated trench material and the excavated trench material.
7. Backfill trenches with Class C concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
8. Provide 4-inch-thick concrete base slab support for piping or conduit less than 2'-6" below surface of roadways. After installation and testing of piping or conduit, provide minimum 4-inch-thick encasement (sides and top) of concrete prior to backfilling or placement of roadway subbase.
9. Bulkheads.
 - a. When granular bedding or backfill is provided, place bulkheads of clay soil across the trench at 100 foot intervals to resist the movement of groundwater through the granular material.
 - b. Carefully compact the bulkheads and extend them approximately 3 feet in the direction of the pipe and from the bottom of the trench to a height of 6 inches above the top of the pipe barrel.

10. **Surface Conditions.** Periodically attend to the trench surface during the course of the Contract. Maintain the trench surface in a safe condition and not interfering with natural drainage.

3.3 RIVER CROSSING INSTALLATION

- A. **General.** It is the intent of the plans and specifications to install the crossing in such a manner as to protect the pipe from erosion and to restore, as much as practicable, the riverbanks and bottom to their original condition.
- B. **Pipe Protection.** Protect the pipe from erosion either by concrete encasement around the pipe or by a sufficient depth of compacted backfill as shown.
- C. **Riverbank Restoration and Protection**
 1. Restore the riverbanks by backfilling the trench with mechanically compacted earth to the original ground surface.
 2. The limits of compaction shall extend as shown.
 3. Following completion of the river crossing, place straw bales along the riverbank on each side within 2 feet of the edge of water and of sufficient length to extend beyond the limits of the excavated trench width.
 4. Straw bales shall remain in place until after the riverbanks have been fine graded, fertilized, and seeded, and until such time as the seeding has sufficiently grown to protect the riverbanks from erosion.
- D. **River Bottom Restoration.** Backfill the river bottom trench with mechanically compacted earth.
- E. **Construction Procedure.** Use either of the following methods to install the river crossing.
 1. Option 1.
 - a. Construct an earth embankment from the riverbank to a point beyond the centerline of the river.
 - b. Protect the slopes of the earth embankment from erosion by covering them with 6-mil polyethylene sheeting.
 - c. Extend the sheeting from the river bottom to an elevation 2 feet above the water level.
 - d. Install the main in a trench excavated through the embankment.
 - e. Remove the embankment and material and any excess trench excavation to an off-site disposal area.
 - f. Use the same procedure to install the remainder of the river crossing.
 2. Option 2.
 - a. Construct a cofferdam of sandbags or inflatable bags from the riverbank to a point beyond the centerline of the river.
 - b. Install the main in a trench within the cofferdam.

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- c. Remove any excess trench excavation to an off-site disposal area.
 - d. Remove the cofferdam.
 - e. Use the same procedure to install the remainder of the river crossing.
- 3.4 **CLEANING.** After a section of main is tested and accepted, clean the ground surface of all surplus material including stone, broken pipe, construction material, and all other debris.
- 3.5 **DEMONSTRATION**
 - A. **Leakage Test and Disinfection.** In accordance with Section 01 89 19, "Leakage Test and Disinfection."
 - B. **Visual.** With Owner and/or Engineer/Architect, visually review the main installation for completion. Demonstrate that all main materials and appurtenances are in conformance with the Contract Documents.
 - C. **Final Acceptance.** The visual demonstration for completion of the main installation shall not be considered as final acceptance of the work. Correct all discrepancies "punch listed" at final inspection to the satisfaction of the Engineer/Architect and Owner.
- 3.6 **PROTECTION.** Protect the main appurtenances (valves, hydrants, etc.) from damage during subsequent construction operations. Remove any and all protection at the completion of the project.

END OF SECTION

SECTION 33 05 33

PRESSURE PIPE AND FITTINGS, DUCTILE IRON

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, Section 33 05 30, and all related specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK.** Provide the labor, tools, equipment, and materials necessary to furnish and install the buried ductile iron pipe and fittings in accordance with the drawings and specifications. See Section 40 05 13.53, "Process Piping, Ductile Iron" for exposed flanged ductile iron piping.
- 1.3 **QUALITY ASSURANCE.** In accordance with Section 33 05 30, "Pressure Pipe, Fittings, and Valves, Installation."
- 1.4 **SUBMITTALS.** Submit the following submittal packages in accordance with section 01 33 00, "Submittals." Both packages shall be submitted, reviewed, and approved before installation of the pipe.
 - A. **Submittal Package No. 1 – Pipe Material and Testing Data**
 - 1. Certification of compliance with the referenced standards.
 - 2. Description of proposed testing methods, procedures, and apparatus.
 - 3. Manufacturer’s product data clearly marked for this specific project showing materials, sizes, thicknesses, pressure ratings, coatings, and joint configuration strengths.
- 1.5 **JOB CONDITIONS.** In accordance with Section 33 05 30, "Pressure Pipe, Fittings, and Valves, Installation."
- 1.6 **DELIVERY, STORAGE, AND HANDLING.** In accordance with Section 33 05 30, "Pressure Pipe, Fittings, and Valves, Installation."
- 1.7 **SPECIAL WARRANTY.** (Not used.)

PART 2 - PRODUCTS

- 2.1 **MATERIALS**
 - A. **Ductile Iron Pipe.** Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A21.51, "Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids."
 - 1. Material. The chemical constituents shall meet the physical property recommendations of ASTM A 536, "Ductile Iron Castings," to ensure that the iron is suitable for satisfactory drilling and cutting.

2. Minimum Thickness.

a. Unless otherwise shown, the minimum thickness of the barrel of the pipe shall be:

| Size | Thickness Class |
|-----------|-----------------|
| 3" – 12" | 53 |
| 14" – 24" | 53 |
| 30" – 48" | 53 |

b. Unless otherwise shown, the minimum thickness of the barrel of restrained ball and socket joint pipe (river crossing) shall be:

| Size | Thickness Class |
|-----------|-----------------|
| 4" – 6" | 54 |
| 8" – 12" | 55 |
| 14" – 24" | 56 |
| 30" – 36" | 57 |

3. Coating and Lining.

- a. General. Unless noted otherwise, coat the pipe exterior with a bituminous coating in accordance with ANSI/AWWA C151/A21.51, "Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids," and lined inside with cement mortar and seal coated in accordance with ANSI/AWWA C104/A21.4, "Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water."
- b. Air Mains. All ductile iron air main interiors shall be unlined.

B. **Ductile Iron Fittings.** Ductile iron standard and special fittings shall conform to ANSI/AWWA C110/A21.10, "Ductile Iron and Gray Iron Fittings," or ANSI/AWWA C153/A21.53, "Ductile Iron Compact Fittings."

1. Working Pressures. Fittings shall be suitable for the following working pressures unless otherwise noted:

| Sizes | Pressure (psi) Gray Iron | Pressure (psi) Ductile Iron |
|-----------|-----------------------------|--------------------------------|
| 2" – 12" | 250 | |
| 14" – 48" | 150 | |
| 3" – 24" | | 350 |
| 30" – 48" | | 250 |

2. Coating and Lining.

a. General. Unless noted otherwise, coat the fittings exterior with a bituminous coating in accordance with ANSI/AWWA C110/A21.10, "Ductile Iron and Gray Iron Fittings," or ANSI/AWWA C153/A21.53, "Ductile Iron Compact Fittings,"

and lined inside with cement mortar and seal coated in accordance with ANSI/AWWA C104/A21.4, "Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water."

- b. Air Mains. All ductile iron fitting interiors on air mains shall be unlined.

C. Joints

1. Push-On and Mechanical (Including Restrained Joints). Push-on and mechanical joints including accessories shall conform to ANSI/AWWA C111/A21.11, "Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings." Bolts shall be high-strength low-alloy steel tee head with hex nuts.
2. Flanged. Do not use flanged joints in underground installations except where specified or shown. See Section 40 05 13, "Process Piping, General," for more information on flanged joints.
3. Ball and Socket. Ball and socket joints (river crossing) shall be restrained, boltless, and capable of deflecting up to 15 degrees. The bell, ball, and retainer shall be cast of ductile iron. The gasket shall be of high quality rubber.
4. Gaskets.
 - a. Air and gas piping shall have high-temperature-type gaskets, rated to 300 degrees Fahrenheit (° F.). Material shall be a fluoroelastomer (FKM).
 - b. All gasket types shall be suitable for the material being conveyed.
5. Restrained.
 - a. Allowable only where shown or approved.
 - b. Rated at the pressure rating of the pipe with a safety factor of 2.
 - c. Coat any exposed ferrous surfaces in accordance with AWWA C550. Alternatively, coat the casting body with a TGIC polyester and the wedges and wedge actuators with a fluoropolymer.
 - d. Any bolts shall be high strength low-alloy steel tee head with hex nuts.
 - e. Subject to compliance with the specifications, provide a restrained joint system from one of the following approved manufacturers.
 - 1) Ebaa Iron (3-48-inch diameter [dia.]).
 - 2) Smith Blair (3-24-inch dia.).

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- 3) Romac Industries (3-24-inch dia.).
- 4) Star Pipe (3-48-inch dia.).

D. **Polyethylene Encasement.** Where noted, encase the pipe and fittings with polyethylene film conforming to ANSI/AWWA C105/A21.5, "Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids."

PART 3 - EXECUTION. Install all pipe and fittings in conformance with Section 33 05 30, "Pressure Pipe, Fittings, and Valves Installation."

END OF SECTION

SECTION 40 05 23

PROCESS VALVES, GENERAL

PART 1 – GENERAL

1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, and all related specification sections, apply to this section.

1.2 **DESCRIPTION OF WORK**

- A. **Provide the labor, tools, equipment, and materials** necessary to furnish and install the valves and accessories in accordance with the drawings and the specifications.
- B. **Provide all valves required** for complete functional systems.
- C. **All references to valves shall also imply** gates where applicable.

1.3 **QUALITY ASSURANCE**

- A. Materials and workmanship shall be in accordance with the following standards as referenced herein:
 - 1. ANSI – American National Standards Institute.
 - 2. ASTM – American Society for Testing and Materials.
 - 3. AWWA – American Water Works Association.
 - 4. NEMA – National Electrical Manufacturers Association.
 - 5. NSF – NSF, Inc.
 - 6. OEPA – Ohio Environmental Protection Agency.
 - 7. MSS – Manufacturers' Standardization Society.

1.4 **SUBMITTALS**

- A. **General**
 - 1. Submit all required documents and materials in accordance with Section 01 33 00, this section, and the individual valve specifications.
 - 2. Submit all submittals only under individual valve section designations and not Section 40 05 23, Process Valves, General."
- B. **The following submittal content and schedule requirements** are required to be submitted when indicated by the individual valve specifications.
 - 1. Shop Drawings and Product Data.
 - a. Schedule. No other submittal packages related to this equipment can be approved before this one.

- b. Submittal Package Contents.
 - 1) Manufacturer's name.
 - 2) Body, seating, and trim materials.
 - 3) Dimensions.
 - 4) Connection details.
 - 5) Required clearances.
 - 6) Parts list with materials and part numbers for the valves and accessories.
 - 7) Maximum operating pressure and temperature ratings.
 - 8) Manufacturer's instructions.
 - 9) Electrical data when applicable.
 - 10) Certificate of compliance and proof of design with AWWA standards.

2. Operation and Maintenance (O&M) Manuals.

- a. Schedule. Submit the initial review copy of the O&M manual and the revised copies prior to delivery of the equipment.

- 1.5 **JOB CONDITIONS.** All valves shall be suitable for the service they are installed in.
- 1.6 **DELIVERY, STORAGE, AND HANDLING.** In accordance with Section 01 60 00 and the manufacturer's instructions.
- 1.7 **SPECIAL WARRANTY** (Not used)

PART 2 – PRODUCTS

2.1 **GENERAL VALVE REQUIREMENTS**

- A. **Manufacturer.** Each type of valve shall be supplied by only one manufacturer.
- B. **Materials.** No bronze or brass components shall contain more than 16 percent zinc.
- C. **Fabrication and Assembly**
 - 1. Valve Ends.
 - a. Coordinate furnishing of joint materials with pipe supplier.
 - b. Required valve ends on exposed piping are shown, usually with a symbol. Connections shown include:
 - 1) Flanged. (FF or F) ANSI B16.1, Class 125 unless noted otherwise.
 - 2) Screwed. National (tapered) pipe thread (NPT).
 - 3) Socket. Conform to specifications for adjacent piping.

- 4) True Union. Conform to specifications for adjacent piping. Use true union ends for all polyvinyl chloride (PVC) valves.
- c. Buried. Mechanical joint (MJ), unless noted otherwise.
 - 1) MJ. AWWA C111, rubber gasket joints for ductile iron pressure pipe and fittings.
 - 2) Screwed. NPT.
 - 3) Socket. Conform to specifications for adjacent piping.
- 2. Seals. Buried and submerged valves shall have enclosed, nonlubricated, watertight stem seals.

2.2 OPERATORS

A. General

- 1. Open counterclockwise unless noted otherwise.
- 2. Provide a permanent open direction indicator.
- 3. Furnish operators according to the valve schedule in each valve specification section.
- 4. Supplied and fully warranted by the valve manufacturer.
- 5. Enclose all gearbox components in a cast aluminum or stainless steel weatherproof housing with positive mechanical seals to exclude moisture and dirt and prevent lubricant leakage.
- 6. Furnish lubrication fittings for all gears and bearings.

B. Manual

- 1. Enclosed gear or traveling nut type with no external moving parts.
- 2. Operating force shall not exceed 40 pounds.
- 3. Provide chainwheel and chain for valves over 6 feet above floor.
- 4. All buried valves shall have operating nuts and valve boxes.
- 5. Furnish floor boxes with all valves where operating nut is at concrete slab.
- 6. Provide at least one fixed-bar and one sliding-bar valve wrench for close quarters for each building.

2.3 FINISHES

- A. **Buried valve accessories.** Coat all buried valve accessories with a bituminous material in conformance with ANSI A21.10 (AWWA C110).
- B. **Painted surfaces.** Unless noted otherwise, prime and finish-paint all interior and exterior ferrous surfaces of all valves, operators, and accessories in the factory.
 - 1. Clean Water Service. Interior surfaces according to AWWA C550. Exterior surfaces according to Section 09 90 00, "Painting."

- 2. Wastewater Service. Interior and exterior surfaces to be coated with a fusion-bonded epoxy according to Section 09 90 00.
- C. **All valve operator and accessory coatings** in contact with potable water shall meet NSF Standard 61 and be listed by NSF and/or the OEPA.
- D. **Do not paint stainless steel** surfaces unless noted otherwise.

2.4 VALVE ACCESSORY PRODUCTS

A. Valve Boxes

- 1. Standard, adjustable, heavy pattern, cast iron extension type, three piece, screw type, and with 5 1/4 inch inside diameter.
- 2. Sufficient length to extend from valve to finished grade.
- 3. Set tops at established grades.
- 4. Mark cover with pipe function.

| Valve Size | Base |
|-----------------|---|
| 4" and smaller | round, 8" in height, 10-7/8" diameter at bottom |
| 6" and 8" | round, 11" in height, 14-3/8" diameter at bottom |
| 10" through 16" | oval, 9-1/2" in height, 21" by 12-1/2" diameter at bottom |
| 18" and 20" | oval, 10" in height, 25-1/2" by 16" diameter at bottom |
| 24" | dome, 5" in height, 15" diameter and 17" square flange bottom |

- B. **Valve Wrenches.** T-bar design with socket. Length shall be sufficient to comfortably operate valves.

PART 3 – EXECUTION

- 3.1 **EXAMINATION.** Verify job conditions and intended valve service before ordering each valve. Inspect for damage to valve resulting from shipping and handling prior to installation.

3.2 INSTALLATION

A. Procedures

- 1. Remove debris from inside piping system before installation.
- 2. Install in accordance with manufacturer's instructions.
- 3. Install plumb and level.
- 4. Install free from distortion.
- 5. Install with proper support and restraint.
- 6. Coordinate valve mounting position with respect to operating convenience, maintenance access, and safety.
- 7. Locate all valve operator access only after coordinating with the Owner's operation personnel and the Engineer/Architect.
- 8. Remove and reinstall valves which are installed with improper orientation at no additional cost to the Owner.

3.3 **REPAIRS/RESTORATION.** Repair or replace any damage to the valve or operator or chips, dents, scratches, stains, or other disfiguring of surrounding floors, walls, and/or accessories to the satisfaction of the Owner and/or Engineer at no additional cost to the Owner.

3.4 **FIELD QUALITY CONTROL**

A. **Visual**

1. Verify conformance with manufacturer's shop drawings and instructions.
2. Report defects in workmanship, materials, and performance.
3. The Contractor, Owner, and/or Engineer shall inspect the equipment for deficiencies.

B. **Field Service and Start-Up**

1. Follow manufacturer's instructions.
2. Adjust stops and friction clamps for proper operation.
3. Demonstrate proper operation under actual service conditions.
4. Demonstrate valves that have moving internal mechanisms that operate without manual operation shall have functions demonstrated for a minimum of three repeat cycles. This includes, pressure reducing valves, back pressure valves, check valves, pressure relief valves, surge anticipator, and surge relief valves.
5. Demonstrate that all valves are watertight under maximum design operating pressures when operated for a minimum of three repeat cycles of open and close during the operational demonstration period.

END OF SECTION

SECTION 40 05 23.22

PROCESS VALVES, PLUG

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; Section 40 05 23, "Process Valves, General"; and all related specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK.** In accordance with Section 40 05 23, "Process Valves, General."
- 1.3 **QUALITY ASSURANCE.** In accordance with Section 40 05 23, "Process Valves, General."
- 1.4 **SUBMITTALS.** Submit each of the following submittal packages in accordance with Section 40 05 23, "Process Valves, General," and this section.
 - A. **Submittal Package No. 1 – Shop Drawings and Product Data**
 - B. **Submittal Package No. 2 – Operation and Maintenance Manuals**
- 1.5 **JOB CONDITIONS.** In accordance with Section 40 05 23, "Process Valves, General."
- 1.6 **DELIVERY, STORAGE, AND HANDLING.** In accordance with Section 40 05 23, "Process Valves, General."
- 1.7 **SPECIAL WARRANTY** (Not used)

PART 2 - PRODUCTS

- 2.1 **PLUG VALVES.** In accordance with Section 40 05 23, "Process Valves, General."
 - A. **Manufacturers**
 - 1. Full Port Plug Valves. Subject to compliance with the specifications, provide the full port plug valves from one of the following manufacturers.
 - a. Clow/M&H (3 inches – 12 inches).
 - b. DeZurik (3 inches – 36 inches).
 - c. Milliken/Pratt (2 1/2 inches – 12 inches).
 - d. Crispin KFLo (2 1/2 inch – 12 inches)
 - e. Val-Matic (1/2 inch – 36 inches).
 - B. **Description.** Nonlubricated, eccentric-type plug valves.

C. **Performance**

1. All plug valves, for whatever service, shall be capable of passing "pigging" cleaning equipment in either direction and without the use of special equipment.
2. Valve Design Pressure.
 - a. 12 Inches and Under. 175 pounds per square inch (psi).
 - b. 14 Inches Through 36 Inches. 150 psi.
 - c. 42 Inches and Larger. 125 psi.
3. Valve Capacity.
 - a. Full Port Plug Valves. Port clear areas shall be a minimum of 100 percent port.

D. **Materials**

| Part | Material |
|-----------------|---|
| Body | ASTM* A 126, Class B cast iron or ASTM A 536 ductile iron |
| Seat Overlay | Not less than 90% nickel or Type 316 stainless steel |
| Plugs | One-piece ductile or cast iron |
| Sealing Surface | BUNA-N or chloroprene |
| Grit Seals | PTFE |

*ASTM – American Society for Testing and Materials

E. **Fabrication and Assembly**

1. In conformance with AWWA C517 except where noted below.
2. Furnish valves 3 inches and larger with a welded-in overlay seat. Overlay thickness shall be not less than 0.125 inch. Sprayed, plated, or screwed-in seats are not acceptable.
3. Equip valve plug with grit seals on the upper and lower bearing journals to reduce torque and prevent dirt from entering bearing and seal area.
4. Valve Shaft Seals.
 - a. Dual "U" cup type in accordance with AWWA C517-05, Section 4.4.7 or a multiple V-ring and installed on the upper and lower plug shafts.
 - b. Seals shall be self-adjusting and repackable without removing the bonnet from the valve.
 - c. Furnish valves with a spacer bonnet to allow for visual inspection for shaft leakage.

5. Valve Shaft Packing.
 - a. Packing adjustment shall not result in an increase in plug friction or resulting torque.
 - b. Packing replacement shall be achieved without need to cut packing during reinstallation and not require cap removal.
6. Valve Bearings. Furnish valves with replaceable sleeve-type bearings.
 - a. 20-Inch-Diameter Valves and Under. The bearings shall be of sintered, oil-impregnated Type 316 stainless steel ASTM A 743, Grade CF8M.
 - b. Over 20-Inch-Diameter Valves. The bearings shall be bronze or stainless steel Type 316.

2.2 **OPERATORS.** In accordance with Section 40 05 23, "Process Valves, General."

A. **Manual**

1. Valves 6-inch and smaller shall be wrench-operated and valves 8-inches and larger shall have worm gear operators.
2. All buried service plug valves shall have worm gear operators.
3. Wrench-operated valves shall be capable of being converted to worm gear or automated operation without removal of the bonnet or plug from the valve.
4. Equip all wrench-operated valves with a 2-inch square nut for use with removable levers or extended "T" handles.
5. Worm Gear Operators.
 - a. Heavy-duty ductile iron construction with ductile iron quadrant supported on top and bottom by oil-impregnated bronze bearings.
 - b. Manufacture the worm gear and shaft of hardened steel and run on high-efficiency roller bearings.
 - c. Gear shall have both open and closed stops, shall be flush-mounted to the valve, exposing no portion of the plug stem and shall be rated for the valve design pressure rating for bidirectional shutoff.
 - d. Buried service gears shall be designed and certified to withstand input loads of up to 300 foot-pounds minimum without damage.

2.3 **VALVE ACCESSORY PRODUCTS.** In accordance with Section 40 05 23, "Process Valves, General."

PART 3 – EXECUTION. In accordance with Section 40 05 23, "Process Valves, General."

END OF SECTION

SECTION 40 90 00

INSTRUMENTATION SYSTEMS BASIC REQUIREMENTS

PART 1 - GENERAL

- 1.1 **RELATED DOCUMENTS.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.
- 1.2 **DESCRIPTION OF WORK**
- A. **Scope of Work.** Provide the labor, tools, equipment, and materials necessary to implement general administrative and procedural requirements for instrumentation installations. The following administrative and procedural requirements are included in this section to expand the requirements specified in Division 1:
1. Quality assurance.
 2. Submittals.
 3. Job conditions.
 4. Delivery, storage, and handling.
 5. Special warranty.
 6. Definitions.
- B. **Work under this contract** consists of furnishing, installing, testing, and guarantee of the complete instrumentation system in proper working order as shown and as specified herein. The following is a general summary of work comprising the instrumentation.
1. Instrumentation equipment specified in Sections 40 90 00 through 40 93 13.
 2. Branch circuit conduit and wiring to all instrumentation equipment.
 - a. 120 volt 1 phase circuit breakers are provided for instrument use at designated panelboards as work of Division 26.
 - b. Work of this section begins with branch circuit connection to these circuit breakers and includes branch circuit wire and conduit.
 3. Signal wiring between all instrumentation equipment.
 4. Interlock wiring between instrumentation equipment and equipment furnished under other divisions of the specifications.
 - a. Interlocks shall include alarm contacts, control contacts, and 4-20 milliampere (mA) analog signals.
 - b. Such interlocks are required by diagrams, schematics, notes, or narrative descriptions.

- c. Extend these interlocks to and land them on terminal strips provided in equipment, motor starters, motor control centers, etc.
- 5. Raceway system interior to structures and exterior within 5 feet of structures for instrumentation wiring.
 - a. Provide a raceway between buildings only as part of Division 26 work.
 - b. See Electrical Plans for extent of such raceway.
 - c. Any additional exterior raceway required shall be part of work of this section.

1.3 **QUALITY ASSURANCE**

- A. **Regulatory Requirements.** Comply with requirements of the National Electrical Code (NEC) and all other applicable federal, state, and local codes and regulatory requirements.
- B. **Standards.** Materials and workmanship shall conform to the following standards:
 - 1. American National Standards Institute (ANSI).
 - 2. American Society for Testing and Materials (ASTM).
 - 3. Electronic Industries Association (EIA).
 - 4. Factory Mutual (FM).
 - 5. International Electrotechnical Commission (IEC).
 - 6. Institute of Electrical and Electronic Engineers (IEEE).
 - 7. International Society of Measurement and Control (ISA).
 - 8. International Standards Organization (ISO).
 - 9. Joint Industrial Council (JIC).
 - 10. Manufacturer's Standardization Society (MSS).
 - 11. National Electrical Code (NEC).
 - 12. National Electrical Manufacturers Association (NEMA).
 - 13. National Fire Protection Association (NFPA).
 - 14. Scientific Apparatus Manufacturers Association (SAMA).
 - 15. Underwriters' Laboratories (UL).
- C. **System Responsibility.** The instrumentation and control system shall be furnished by a single Provider who shall be responsible for the entire system. The responsibilities of Provider shall include the following:
 - 1. Preparation of all submittals.
 - 2. All factory and field testing.
 - 3. Furnishing and calibration of all instruments.
 - 4. Configuration and programming of instrumentation.
 - 5. Thirty day operational demonstration.
 - 6. Warranty work for the entire system.

D. **Qualifications**

- 1. **Manufacturer’s Qualifications.**
 - a. A financially sound firm with at least 5 years of experience in design, manufacture, supply, service, and support of instrumentation and control equipment specified for this project.
 - b. A record of prompt shipments in accordance with contract obligations.
 - c. A documented quality assurance program complying with industry and agency standards.
 - d. A documented product safety policy relevant to the products being manufactured for this project.
- 2. **Installer’s Qualifications.** An approved manufacturer’s representative factory-educated in maintenance, installation, and start-up of the instrumentation and control equipment to be supplied.

1.4 **SUBMITTALS.** Submit the following submittal packages in accordance with Division 1 and this section.

A. **Submittal Package No. 1 – Product Data and Shop Drawings.**

- 1. **Schedule.** No other submittal packages related to the equipment can be approved prior to this one.
- 2. **Package contents.**
 - a. **Letter of Responsibility.** A letter from the responsible System Integrator stating acceptance of system responsibility.
 - b. **Product Data.** Manufacturer’s technical product data sheets for items listed in the instrument schedule and for any additional components required for a complete functional system. Delete inappropriate or nonapplicable information on each page of product data submittals.
 - c. **Shop Drawings.** Shop drawings to substantiate that the materials and equipment comply with the specification requirements.
 - 1) **Materials List.**
 - a) A list of materials giving quantities, manufacturer’s name, and catalog numbers listed by equipment tag numbers.
 - b) All equipment shall have a tag number.
 - c) The list shall identify sheet numbers where each tag numbered item can be found.
 - 2) **Dimensional Drawings.** Dimensional drawings for instrument mounting, process connection details,

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instrument cabinets, panels, and each piece of equipment.

- 3) Wiring Diagrams.
 - a) Field wiring diagrams for wiring into and out of control panels, identifying terminal numbers of the field equipment or other remote termination points.
 - b) Master interconnection wiring and piping drawing showing all field- and panel-mounted equipment and terminal identifications. Include each individual manufacturer's system drawings.
 - c) Internal wiring drawings for each control panel identifying each and every component, numbered wire, numbered terminal, and terminal block. Loop diagrams shall follow ISA-S5.4 format.
- d. Samples. Submit a sample nameplate.
- e. Test Procedures. A detailed description of both the factory and field test procedures. Test procedure shall include the following:
 - 1) Description of purpose of each part of test.
 - 2) List of test equipment required.
 - 3) Step-by-step description of each part of test.
 - 4) Sample test data sheets.
- f. Sample Calibration Sheets. Sample calibration sheet for each type of instrument specified.

B. Submittal Package No. 2 – Source Quality Control Submittals

1. Schedule. Operational demonstration cannot begin until this package is approved.
2. Package Contents.
 - a. Test Reports. A written test report for all factory tests. Report shall list results of each step of the test and shall include test data sheets signed and dated by tester.
 - b. Detailed operational demonstration plan.

C. Submittal Package No. 3 – Start-Up Preparation Documents.

1. Schedule. This submittal package must be approved before the equipment start-up and calibration may take place.

2. Submittal Package Contents.
 - a. Initial operation and maintenance (O&M) manual. Each option and accessory shall be clearly and accurately shown. The O&M manuals shall include:
 - 1) Installation instructions and details.
 - 2) Start-up instructions.
 - 3) O&M instructions.
 - 4) Detailed parts list with name, address, and telephone number of supply source.
 - 5) Troubleshooting guide.
 - 6) As-built wiring diagrams and dimensional drawings.
 - 7) Programming procedures.
 - b. Start-up and Calibration request.
 - c. Training schedule.
 - d. Instructor qualifications.
 - e. Instructional materials.

D. Submittal Package No. 4 – Operational Demonstration Preparation Documents.

1. Schedule. The operational demonstration cannot begin until these documents are approved.
2. Submittal Package Contents.
 - a. Signed and dated calibration reports from equipment start-up.
 - b. Operational demonstration request.
 - c. Sample operational demonstration log.

E. Submittal Package No. 5 – Contract Closeout Submittals

1. Schedule. This work is not substantially complete until this package is approved.
2. Package Contents.
 - a. Project Record Documents
 - 1) Provide two working sets of prints of the Contract Drawings and submittals.
 - 2) Furnish an identical bound set, with index tabs, to the Engineer/Architect when field-wiring is to begin.

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- 3) Make all changes during the course of the work to the field set and transfer to the office set of prints on a weekly basis.
- 4) Send dated copies clearly showing "As Built" or "As Constructed" information weekly for each affected sheet to the Engineer/Architect.
- 5) Both sets shall be available for comparison by the Engineer/Architect and Owner during the course of the work.
- 6) After project completion, deliver both sets of documents to the Owner and Engineer.

b. Record Drawings.

- 1) Furnish detailed wiring drawings for all instruments and controls.
- 2) Drawings shall show all tag numbers, point-to-point wiring, and terminal numbers used on the external wires.
- 3) In addition, any changes made by the Contractor to internal wiring of equipment or components inside enclosures furnished by the Contractor shall have "As Constructed" revisions to the original manufacturer's drawings detailing these additions or revisions.
- 4) The record drawings shall include all wire numbers and terminals used plus a list of all settings for each instrument.
- 5) Replace all affected drawings supplied in the O&M manuals with record drawings.

c. Maintenance Service. A maintenance agreement to maintain the instrumentation system after the 1 year contract warranty. The agreement shall list the terms and conditions of this maintenance service along with a price for a second year.

d. Spare Parts List. List spare parts required, including part name, equipment name, stored quantity, manufacturer/source address, telephone number, and salespersons name within the secured storage area.

e. Completed operational demonstration log.

1.5 **JOB CONDITIONS** (Not used)

1.6 **DELIVERY, STORAGE, AND HANDLING**

A. **Packing and Shipping.** Deliver equipment properly packaged and mounted on pallets or skids to facilitate handling of heavy items. Utilize factory-fabricated type containers or wrappings for components which protect equipment from damage.

B. Inspection and Handling.

1. Inspect equipment to ensure that no damage has occurred during shipment.
2. Handle equipment carefully to prevent physical damage to equipment and components.
3. Remove packaging, including the opening of crates and containers, avoiding the use of excessive hammering and jarring which would damage the electrical equipment contained therein.
4. Do not install damaged equipment; remove from site and replace damaged equipment with new. Inspect all equipment at time of delivery as to model, quantity, and physical condition.
5. Identify all equipment by name and tag number.
6. Site conditions must be clean, dry, heated, and dust-free before equipment is removed from packaging or installed.

C. Storage and Protection.

1. Store the items furnished under this section until they can be installed. Such storage shall meet the requirements of the system supplier and be approved.
2. Use all means necessary to protect the material of this section before, during, and after installation, and to protect the installed work and materials of all other trades.
3. Provide factory-applied end caps to protect all threads on pipes and valves.
4. Obtain a receipt from the Owner for all materials turned over to the Owner.
5. Any materials that the Contractor does not have a receipt for will be considered to have not been turned over to the Owner.

1.7 **SPECIAL WARRANTY** (Not used)

1.8 **DEFINITIONS**

- A. **Manufacturer.** The designer and fabricator of an instrumentation or control product.
- B. **System Integrator.** The designer, assembler, and supplier of the complete instrumentation and control system. The system integrator has responsibility to the Contractor and Owner for a complete functional instrumentation and control system.
- C. **Interior.** For the purposes of this specification, interior is any area within the boundaries of the foundation, walls, and roof of any building or other structure.
- D. **Wet Locations.** Exterior areas, interior areas below grade, and interior areas above grade in which wet materials are processed, pumped, transported, or stored are designated as wet locations. Equipment installed in these areas must bear a manufacturer's certification of suitability for such environments.

- E. **Hazardous (Classified) Areas.** Hazardous (classified) areas, defined in accordance with the NEC, are shown. Conform all equipment installed in these areas to requirements for installation in the designated hazardous area as described in Articles 500, 501, and 502 of the NEC.

PART 2 - PRODUCTS

2.1 GENERAL

- A. **Mounting Hardware.** In accordance with Section 26 05 29, "Supporting Devices."
- B. **Identification.** In accordance with Section 26 05 53, "Electrical Identification."
- C. **Calibrators and Programmers.** Provide calibrators/programmers for all instrumentation equipment furnished under Sections 40 90 00 through 40 95 33 that cannot be calibrated from the controls built into the unit. Provide a minimum of one calibrator/programmer for each type of equipment supplied.
- D. **Adjustable Deadband.** All output contacts from all instrumentation equipment furnished under Sections 40 90 00 through 40 95 33 shall have a minimum of ± 5 percent deadband adjustment.

2.2 POWER SUPPLIES

- A. **General.** Provide regulated direct current (dc) power supplies suitable for 120 ac volt input (± 25 percent) with fused 24 dc volt output regulated to ± 0.1 percent minimum.
- B. **Manufacturers.** Subject to compliance with the specifications, available manufacturers of power supplies include, but are not limited to, the following:
 - 1. Acopian Corporation.
 - 2. Condor DC Power Supplies, Inc.
 - 3. Moore Industries.
 - 4. PULS.
 - 5. Square D Company.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Existing Conditions.**
 - 1. Examine the site and existing facilities.
 - 2. Compare the site and existing facilities with the drawings and specifications.
 - 3. Locate connections of existing facilities and any obstructions which may be encountered and conduct work to minimize disruption to existing conditions.

- B. **Field Measurements.** Field-verify all locations and dimensions to ensure that the equipment will be properly located, readily accessible, and installed in accordance with all pertinent codes and regulations, the contract documents, and the referenced standards.

3.2 **INSTALLATION - GENERAL**

A. **General**

1. Locations of instruments shown are approximate unless specifically dimensioned. Install the instruments to perform their intended function in full coordination with existing conditions and the work of other trades.
2. Furnish, fabricate, and mount all instrument stands and brackets.
3. Mount stands and instruments in accordance with installation detail drawings.
4. All stands must be level, plumb, rigid, and free from vibration.
5. Add additional support where required for vibration-free mounting.

B. **Instrumentation wiring is shown** schematically or described by narrative in the specifications.

1. Provide type and quantity of wiring necessary to perform the function specified in Division 40 and shown.
2. See Division 26 wire and cable sections for “uses permitted.”
3. Analog signal conductors and discrete signal conductors shall always be in separate conduits or cable tray compartments.
4. Power wiring shall be in conduits and cable tray compartments separate from all signal wiring.
5. Power wiring wherever required by instruments or equipment provided as part of the instrument system is work of this section.
6. Terminate field wiring for equipment specified under this section.
7. The system integrator shall check instrument installation and field wiring before instrument devices are powered.
8. All signal shields shall have only one ground point located at the closest control panel.
9. Seal around all conductors inside conduits as they enter equipment.
10. Use watertight seal (closed cell RTU foam type) entering or leaving every building, box, or instrument.
11. Install conduit water relief or “weep” on the system side of all seals to prevent intrusion of water into the equipment.

12. Spare Wiring.
 - a. Signal and interlock wiring shall contain spare conductors in every raceway.
 - b. Provide spare conductors in pairs and shall be clearly and distinctly marked at every access point indicated where the pairs start and stop.
 - c. Provide a minimum 25 percent of the number of active pairs as spare pairs with a minimum of one spare pair.

C. **Threaded Connections.** Procedure.

1. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.
2. Align threads at point of assembly.
3. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
4. Assemble joint, wrench-tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

D. **Tagging.** Provide all instrumentation equipment with stainless steel identification tags in accordance with the plans and Section 26 05 53, "Electrical Identification." Mount the device tags using stainless steel screws.

3.3 **ADJUSTING.** Adjust alarm and control set points to their operational values before the start of the field test. Perform calibration adjustments before the start of the field test.

3.4 **FIELD QUALITY CONTROL**

A. **Piping Tests.** After piping systems have been put into service, inspect for leaks. Adjust pipes, valves, or fittings to stop leaks; replace equipment if leak persists.

B. **Field Test**

1. A technical representative shall perform a field test on the entire instrumentation and control system. Owner shall be present for test.
2. All equipment provided by the system integrator and all interrelated equipment provided by other suppliers, such as pumps, blowers, valve operators, chemical feeders, motor controls, etc., shall be installed and operating properly before the test starts.
3. All test equipment and materials shall be provided by the system integrator.
4. As a minimum, the test shall consist of the following:
 - a. Verify proper calibration of all instruments by independent measurements, such as checking levels with a measuring rod or

pole, performing drawdown tests on wells to check flow rates, performing laboratory tests on samples, etc.

- b. Create temporary test conditions to simulate variations in process operation by throttling valves, controlling pump speed, shutting down process equipment, operating safety devices, etc.
- c. Where safety concerns or process limitations prohibit physical simulation and when agreed to by the Owner, simulated process signals may be used.
- d. Test conditions shall be sufficient to test the operation of every function of the instrumentation and control system including:
 - 1) Alarms and safety shutdowns.
 - 2) Equipment start/stop and speed controls.
 - 3) Pacing of chemical feed equipment.
 - 4) Recorders and indicators.
 - 5) Process controller operation and recovery from upsets.
 - 6) Programmable logic controller (PLC) or Supervisory Control and Data Acquisition (SCADA) system inputs and outputs.
 - 7) PLC or SCADA system programming.
- e. Perform the test according to the test procedures submitted.
- f. As each phase of the test is completed, sign and date test data sheets.
- g. The test data sheets shall document any modifications to the control and alarm settings, process engineering unit changes, programming changes, wiring changes, problems encountered, and steps taken to solve the problems.

3.5 **CLEANING.** Keep the instrumentation system components clean and free of dust during the storage, start-up, demonstration, and warranty period. Clean dust and dirt accumulation inside and outside control panels and consoles, on a monthly basis, during start-up and demonstration period.

3.6 **DEMONSTRATION**

A. **General.**

- 1. Perform a 30-day operational demonstration of the complete instrumentation and control system.
- 2. The demonstration shall conform to the following requirements and the requirements of Section 01 79 00.
- 3. Do not begin the 30-day operational demonstration until the field test is completed, an operational demonstration plan and field testing reports have been approved, and all problems and defects encountered during the field test have been corrected.

- B. **System Acceptance.** System acceptance shall not occur until the entire instrumentation and control system has performed as a functioning unit continuously for 30 consecutive days without loss of control and monitoring function, except for periods of scheduled maintenance. Failure of any component, software function, or required function shall require a restart of the 30 day operational demonstration until 30 consecutive days of continuous operation have been completed.
- 3.7 **PROTECTION.** Protect the instrumentation system components from water, dust, dirt, and corrosion during the start-up, demonstration, and warranty period.
- 3.8 **INSTRUCTION OF OPERATIONS PERSONNEL**
- A. **Field Training.** Conduct training in accordance with Section 01 79 00 including equipment specified in this section, and related electrical and interfaces to equipment provided by other division sections. Conduct training sessions as follows:
1. One, 4 hour session.
 2. The training program shall provide the plant operations personnel with the capability of operating the software of the process control system supplied.
 3. Training courses shall include hardware components emphasizing operation. Software training shall include the fundamental software organization and operation of the delivered system.
 4. Minimum Goals. Training shall incorporate operational requirements described in these specifications. Training shall provide the plant operations personnel with the following:
 - a. Control set point and dead band modifications.
 - b. Response to alarm displays and error indications.
 5. Provide training at the plant site.
 6. Provide text material for future reference.

END OF SECTION

SECTION 44 12 05

INFLUENT SCREENS AND COMPACTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS.

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; and all other related specification sections, apply to this section.
- B. **Electric motors shall be furnished** as part of the work of this section and shall conform to all applicable portions of Division 26.
- C. **Instrumentation and control work**, except as specified herein, is included in Division 40. Instrumentation and controls provided in this section shall adhere to Instrumentation and Control Specifications Sections in Division 40.

1.2 DESCRIPTION OF WORK.

- A. **Scope of Work.** Provide all labor, materials, tools, and equipment necessary to furnish and install two automatic self-cleaning multiple rake bar screens and compactors, in accordance with the drawings and as specified herein. The manufacturer will also supply the control system required to monitor and control the equipment, as well as any screen and compactor appurtenances necessary for the installation. The equipment will be of the latest design and will be fabricated of the specified materials and in a fashion that will fully perform the functions described in these specifications.

1.3 QUALITY ASSURANCE

- A. **Codes.** Perform all work to furnish and install the mechanical screens in compliance with all federal, state, and local codes.
 - 1. NEC – National Electrical Code.
- B. **Standards.** Materials and workmanship shall be in conformance with the following standards:
 - 1. ABMA – American Bearing Manufacturers Association.
 - 2. AGMA – American Gear Manufacturers.
 - 3. ANSI – American National Standards Institute.
 - 4. ASME – American Society of Mechanical Engineers.
 - 5. ASTM – American Society for Testing and Materials.
 - 6. AWS – American Welding Society.
 - 7. NEMA – National Electrical Manufacturers Association.
 - 8. IEEE – Institute of Electrical and Electronics Engineers.
 - 9. UL – Underwriters' Laboratories, Inc.

- C. **Regulatory Agencies.** Perform all work in compliance with the requirements of the following regulatory agencies:
 - 1. OSHA – Occupational Safety and Health Administration.
- D. **Manufacturer's Qualifications.** The manufacturer of the self-cleaning fine screens shall have a minimum of 10 successfully operating installations and a minimum of 5 years experience in the manufacture of automatic self-cleaning screens similar to these specified. The list of these installations and their installation/commission dates shall be submitted verifying the above required experience.

1.4 **SUBMITTALS**

- A. **Product Data.** Furnish manufacturer's product data including cut sheets, general descriptive brochures, equipment specifications, and materials of construction.
- B. **Shop Drawings.** Submit shop drawings and product data for review in accordance with Section 01 33 00 "Submittals" and include:
 - 1. Manufacturer's name and model numbers.
 - 2. Repair parts.
 - 3. Detail the enclosure type with dimensional layout and required clearances.
 - 4. Conduit entry and exit areas.
 - 5. Terminal strip layouts clearly showing all field connections, acceptable range of wire sizes, and locations.
 - 6. Weights.
 - 7. Anchor bolts.
 - 8. Complete Bill of Materials listing clearly identifying model number, description, quantity of each item, and identifying labels used inside the panel and on panel drawings.
 - 9. Provide schematics and diagrams for power and control wiring:
 - a. Labels on the control schematic for control relays, instrumentation switches, indication lights, etc., shall correspond to the equipment tags/labels indicated on the control schematic Drawings included in the plans. Include a label above each timing relay indicating the range and setpoint of the timing relay.
 - b. Detail wiring diagrams and differentiate between instrumentation suppliers and field-installed customer wiring. Show both power and control wiring. Show terminal strip information identifying all customer field terminations. Provide project specific wiring diagrams. Generic wiring diagrams are not acceptable.
 - c. Terminal strip layout shall also include a label next to each connection indicating a signal description. Handwritten terminal numbers are not acceptable.
 - d. Provide control systems engineering to produce custom unit elementary drawings showing inter-wiring and interlocking between components and to remotely-mounted devices. Include

and identify all connecting equipment and remote devices on the schematics. The notation "Remote Device" will not be acceptable. Show wire and terminal numbers. Indicate special identifications for electrical devices per the Drawings.

10. Coatings.
 11. Complete description in sufficient detail to permit an item-by-item comparison with the specifications.
 12. Power/utility requirements and a one-line diagram indicating breaker type and size, starter type and size, device rating, and load's nameplate legend.
 13. Variable frequency drives (VFDs) shall include overcurrent protection with size and type indicated, input and output inductor (choke) size and type, horsepower rating of the VFD, manufacture of VFD, with factory parameter settings.
 14. Manufacturer's instructions on handling, installation, and operation and maintenance.
 15. Manufacturer's qualifications.
- C. **Operation and Maintenance (O&M) Manuals.** Submit O&M manuals in accordance with Sections 01 33 00 "Submittals" and 01 79 00 "Start-up, Demonstration, and Training" of these specifications. Submit the initial review copy of the O&M manual and two revised paper copies prior to delivery of the equipment. O&M manuals shall include the following: detailed parts lists, repair data, electrical diagrams, troubleshooting data, and repair parts and maintenance materials.
- D. **Operator Training Information.** Submit operator training data in accordance with Section 01 79 00 "Start-up, Demonstration, and Training" and operator training lesson plans in accordance with Section 01 33 00 "Submittals," with the six revised copies of the O&M manual.
- E. **Personnel Qualifications.** Submit qualification statements, in accordance with Section 01 33 00 "Submittals," of all manufacturer's representative personnel that will be servicing the equipment or conducting the operator training sessions with the two revised paper copies of the O&M manuals.
- F. **Manufacturer's Representative Reports.** Submit manufacturer's representative reports, in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," within 48 hours of each site visit. Include product and material certifications and inspection data as specified in Section 01 33 00 "Submittals," with reports.
- G. **Site Test Reports.** Submit a test report in accordance with Section 01 79 00 "Start-up, Demonstration, and Training" within 48 hours of completion, suspension, or termination of testing the mechanical screen.
- H. **Controls**

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1. Shop Drawings. Submit shop drawings showing instrumentation, control panels, control panel components, software, software licenses, accessories, panel layout drawings, panel wiring diagrams, and bill of materials.
 - a. Panel drawing submittals shall be complete, fully demonstrating compliance with all specification requirements and features. Panel drawings shall include, but not be limited to, panel layout and bill of materials, panel power wiring schematics, and panel input/output wiring diagrams for each panel supplied.
 - b. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. Panel drawings shall be at least 11x17 (inch) print size. As a minimum, the panel drawings shall include interior and exterior panel elevation drawings to scale, nameplate schedule, conduit access locations, and panel construction details.
 - c. Panel control schematics and interconnection diagrams detailing the electrical connections of all equipment in and on the panel. Diagrams shall include power and signal connections, UPS and normal power sources, all panel ancillary equipment, protective devices, wiring and wire numbers, and terminal blocks and numbering.
 - d. Point to point I/O wiring diagrams depicting wiring within the panel as well as connections to external devices. The diagram shall identify all device terminal points that the system connects to, including terminal points of equipment provided by others, Wiring labeling used on the drawings shall match that shown on the Contract Documents or as developed by the manufacturer and approved by the Owner/Engineer. Two-wire and four-wire equipment shall be clearly identified and power sources noted. Submit final wire numbering scheme for approval by the Owner/Engineer. Point-to-Point drawings shall be 11x17 (inch) minimum in size.
 - e. Submit construction details, NEMA ratings, intrinsically safe barrier information, gas sealing recommendations, and purging system details, for panels located in hazardous locations or interfacing to equipment located in hazardous areas.
 - f. Submit evidence that control panels shall be constructed in conformance with UL 508 and bear the UL seal confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL seal and any inspections shall be borne by the Contractor and included in the contract.
 - g. Submit seismic calculations and anchoring requirements in conformance with Division 1.

- 2. Testing Plan.
 - a. Test Procedure Submittals: Submit the procedures proposed to be followed for each test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Include sign-off forms for each testing phase or loop with sign-off areas for the Supplier, Engineer, and Owner. Refer to Section 3 for specific testing requirements, and submit separate procedures for each specified test phase.
 - b. Test Documentation: Upon completion of each required test, document the test by submitting a copy of the signed-off test procedures. Testing shall not be considered complete until the signed-off test procedures have been submitted and favorably reviewed. Submittal of other test documentation, including "highlighted" wiring diagrams with field technician notes, are not acceptable substitutes for the formal test documentation.
 - c. Each loop shall have a Loop Status sign-off form to organize and track its inspection, adjustment and calibration.
 - d. Each active analog subsystem element shall have a Component Calibration form.

1.5 **JOB CONDITIONS**

- A. **Coordination Interfacing.** Coordinate with all other trades to prevent delays, errors, or omissions.
- B. **Environmental Conditions.** All equipment components shall be suitable for operation within a Class 1, Division 1, Group D indoor area.

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **Deliver, store, and handle** the mechanical screen in accordance with Section 01 60 00 "Materials and Equipment" and the manufacturer's instructions.

1.7 **SPECIAL WARRANTY**

Not used.

PART 2 - PRODUCTS

2.1 **EQUIPMENT**

- A. **Multiple Rake Bar Screens**
 - 1. Each mechanically-cleaned multiple rake bar screen shall be furnished complete with bar rack, dead plate, discharge chute, side frames, covers, rake blades, drive chains, sprockets and bearings, scraper assembly, drive motor, gear reducer, anchor bolts, controls and all accessories and appurtenances specified or otherwise required for a complete and properly operating installation.

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2. There shall be at least a 36-inch clearance between any part of the screen assembly and the upstream gate to allow for maintenance of screen or gate. Each screen shall be a front-cleaned, front-return, multiple-rake design. Configurations that have rakes returning on the clean side of the screen, screens with single rakes, and screens employing brushes and spray water for screenings removal shall not be approved for this installation.
3. The screen frame shall support all required loads. Side frames shall be fabricated from a minimum 0.19" thick Type 304 stainless steel plates. The shape of the side frame shall act as the chain guide tracks without additional L-shaped profiles. The side frame U-shaped supports shall be bolted to each end of the frame forming the chain guide pocket. The U-shaped profiles shall have a minimum height of 2" and a width of 2.75". Guide tracks that extend into the flow shall not be approved. The support frames shall be securely anchored onto the operating floor.
4. The bar rack shall consist of equally-spaced, bars that are inclined from the horizontal with the inclination angle specified. The bars shall be spaced to maintain the screen opening given in the design criteria. The bar rack shall be securely fastened to the frame of the screen and bars shall be readily removable.
5. Bars shall be tear drop shaped 6 mm wide by 40 mm deep with a R1.5 radius on the entrance and R1.25 radius on the exit, from Type 304 stainless steel.
6. Each bar rack shall be directly followed by a dead plate designed to maintain a close clearance between the rake mechanisms and the dead plate surface. The dead plate shall extend to the discharge point and shall be fabricated from 0.16" thick Type 304 stainless steel.
7. Dead plates shall be removable from the influent side of the screen.
8. A discharge hood enclosure shall be provided that fully encloses the discharge section of the screen. A removable panel shall be provided permitting easy access to the discharge area. A discharge plate shall direct screenings released from the rakes to the container or solids handling equipment below. The discharge hood shall be constructed from Type 304 stainless steel.
9. The screen shall be provided with easily removable, sufficiently stiffened covers fabricated from Type 304 stainless steel plates. The covers shall enclose all sides and bolted in place.
10. Side seals shall be constructed of 0.25" thick neoprene strips shall be fastened to the side frames to seal the lateral gaps between the side frames and the channel walls.
11. Chains shall be heavy duty roller type fabricated from Type 304 stainless steel. The minimum chain breaking load shall be 25,000 lbf. Chain rollers shall be Type 304 stainless steel with a diameter of 2.36". Rollers of polyamide or other non-metallic material shall not be approved. Chain pins and bushings shall be hardened Type 420 stainless steel. Chains shall not require lubrication.
12. Each screen shall be provided with two upper and two lower sprockets from Type 304 stainless steel.

13. Upper bearings shall be four-hole flanged ball bearings. Bearings shall be provided with Zerk fittings for greasing. The casing shall be made of painted cast iron. The take-up screw shall be M30 thread made of high-strength stainless steel. The drive shaft shall have a minimum diameter of 3.15” and be constructed from painted Type A656 steel.
14. Lower bearing shall be ceramic, self-lubricating PET type and shall be maintenance free. Bearing housing shall be sealed with O-rings. Stub drive shaft shall be Type 304 stainless steel. Lower bearings that require lubrication shall not be approved.
15. Rakes shall be cut from a single 0.40” thick Type 304 stainless steel plate and mounted to a rake frame, which in turn is secured to the stainless steel roller chain on each side. The rakes shall have stainless steel teeth matching and fully engaging the bar spacing of the bar rack, and shall be replaceable.
16. A pivoting scraper mechanism shall be positioned at the point of discharge and shall be attached to the side frames. The scraper shall clean the rake on each pass and return to its rest position with minimal stress. The scraper shall be designed such that screenings do not wrap around the rake or scraper. The scraper shall be provided with a scraper bar made from Type 304 stainless steel a replaceable wiper made of UHMW-PE. The scraper shall be connected with the frame through two scraper arms fabricated of Type 304 stainless steel. Designs that require more than two arms, springs or other dampener type devices shall not be approved.
17. Drives with a helical worm gear reducer shall be a completely enclosed unit. Gear reducer shall have ball or roller bearings throughout with all moving parts immersed in oil. Gear reducers which require periodic disassembly of the unit and manual re-greasing of bearings shall not be approved. The nominal input power rating of the gear reducer shall be at least equal to the nominal horsepower of the drive motor. Gear reducer shall be designed and manufactured in compliance with applicable AGMA or equivalent standards.
18. The motor for each screen shall be TEFC, 2.0 Hp, 1800 RPM, 460 volt, 3 phase, 60 Hz. The motor shall be NEMA design code B and be direct coupled to the reducer, and suitable for use in a hazardous location.
19. Materials of Construction. All moving wetted parts, all wetted parts on which the moving parts ride, or all screen components under guiding, bearing, or driving loads including but not limited to the shafts, links, guide rails, and all connection hardware, shall be completely corrosion-resistant and shall be made of Type 304 stainless steel unless noted in the Article 2.1.A paragraphs above.

B. Screenings Compactors

1. Each compactor shall be provided by the screen manufacturer and fully coordinated with the screen design for efficient charging, dewatering, compaction, and bagging of the screenings collected by the screen.
2. Each compactor shall be capable of handling up to 140 cubic feet per hour of wet screenings with a minimum feed concentration of 5- to 10-

percent dry solids and compress the screenings to achieve up to an approximate 80-percent reduction in volume.

3. Compactor components and their materials of construction shall be the following;
 - a. The press housing shall be made of Type 304 stainless steel.
 - b. The press screw shall be made of Type 304 stainless steel or high-impact alloy.
 - c. The reject water trough shall be made of Type 304 stainless steel.
 - d. The removable splash guard shall be made of Type 304 stainless steel.
 - e. The spray bar shall be made of Type 304 stainless steel and shall have eight 1/4 inch brass spray nozzles using a total of 13 gpm at 40 psi.
 - f. The drive shaft shall rotate on two ball-type bearings.
 - g. The support plates shall be integral to the main body of the unit and shall be made of Type 304 stainless steel.
 - h. The drive unit shall be a single-stage, parallel shaft helical reducer 78.90:1 ratio, hollow shaft. This unit shall be driven by a motor no larger than 5.0 horsepower. The motor shall be 460 volt, 60 Hz, 3 phase. Over-current, short-circuit, and overload protection shall be provided as well as a NEMA starter for the control of the motor. A phase detection relay shall be provided to protect the motor from single phasing.
 - i. The solids discharge zone shall be of a Type 304 stainless steel pipe extension flanged to the outlet to extend dewatering time and enhance frictional dewatering forces. The pipe extension shall be inclined and have an inside diameter of 10” initially, and expand to 12” to maximize discharge distance. The outlet of the solids discharge pipe shall be fitted with a bagger to contain all compacted screenings as they are discharged into a roll-off hopper.

2.2 CONTROLS

- A. **Controls for each screen and compactor** equipment panel shall be mounted in a single Type 304 stainless steel, NEMA 4X panel to be installed as shown on the Drawings. Each panel size shall be designed to fit within the allocated space inside the Preliminary Treatment building.
 1. Controls shall include a main breaker, door-mounted disconnect switch, starters, transformers, fuses and fuse block, Allen Bradley, PLC, Operator Interface, hand-off-automatic (HOA) switches, repeat cycle timers, liquid level timer, delay timers, and running lights to automatically operate the equipment package on a liquid-level control signal, timed or continuous basis. All aspects of the equipment must be coordinated and interconnected to provide a complete system.
 2. A circuit shall be provided for connection to a remote level switch to be located in a Class I, Division 2 hazardous area, per the drawings. This circuit shall include an intrinsically safe barrier relay to which the level

- switch shall be wired. Spare output contacts shall be provided for remote signaling of high well level.
3. Two spare normally open contacts shall be provided for remote indication of screen failure. Similarly, provide two spare contacts for screenings compactor failure.
 4. The Contractor shall coordinate the function of the control panel with all related equipment.
- B. **Power Requirements** shall be 460 volt and 60 hertz for the screening and compacting equipment panel local panel, and 120 volt and 60 hertz for the control circuits unless intrinsic safety or analog circuits are designed.
- C. **Control Cabinet.** Each mechanical screen control panel shall be provided with a Allen Bradley PLC-based controller and monitoring system.
1. The following parameters for each mechanical screen will be available for remote monitoring and control:
 - a. Remote Enable/Disable Command
 - b. Screen Running Forward
 - c. Screen Running Reverse
 - d. Screen Local/Automatic Mode Status
 - e. Common Alarm
 - f. E-Stop Alarm
 - g. Compactor Running
 2. The control panel shall be equipped with an Uninterruptible Power Supply (UPS) unit that supplies battery backup and power conditioning for the PLC, HMI and network devices within the system. UPS shall be sized for a minimum of 30 minutes of runtime at full load.
- D. **Provide all wiring** and accessory items within each screening and compacting equipment panel. Electrical contractor to supply all wiring and conduits between equipment and panels.
- E. **Review electrical and I&C designs**, including Division 26 and Division 40 specifications for compatibility and conflicts with products supplied.

2.3 **FINISHES**

- A. **Shop-Painting.** All surfaces (except for mating surfaces and control panel) shall be blast-cleaned to a Steel Structures Painting Council (SSPC) SP6 finish. Cleaned surfaces shall be shop-primed to minimum dry film thickness of 2.5 mils. All gearboxes, motors, and controls will have manufacturer's standard paint finish.
- B. **Finish-Painting.** All equipment surfaces shall be finish-painted in accordance with Section 09 90 00 "Painting." Stainless steel surfaces shall not be painted.

2.4 SPARE PARTS

- A. None.

2.5 MANUFACTURER

- A. **Manufacturer** of the screening, compacting, and supporting control components shall be one of the following;
1. Huber Technology of Huntersville, NC.
2. Kusters Water of Spartanburg, SC.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Site Verification of Conditions.** Verify that surfaces and site conditions are ready to receive work and the following conditions:
1. Concrete channels are appropriately sized, clean, and ready for installation of mechanical screens.
2. Anchor bolts are of appropriate size and properly located in accordance with approved shop drawings and manufacturer's instructions.
3. Electric conduit is properly sized and located.
4. Opening in upper floor is appropriately sized and located.
B. **Responsibility.** Beginning the installation means the installer accepts the existing surfaces and conditions.
C. **In the event equipment is supplied** which is different than specified, coordinate and make all changes to related structures, controls, drawings, and documentation. All changes must be reviewed and approved by the Engineer prior to any installation of equipment. In addition, all costs associated with such changes, including additional time required for review of the changes by the Engineer, shall be the full responsibility of the Contractor.

3.2 PREPARATION

- A. **Protection.** Protect adjacent equipment, structure, and piping, against damage from mechanical screen installation where required.

3.3 INSTALLATION

- A. **Requirements.** Fabrication and installation of the mechanical screen shall be as shown on the drawings, as the manufacturers specified herein, in accordance with the approved shop drawings and the manufacturer's instructions.
B. **Interface with Other Items.** Electrical contractor shall complete all electrical power and control connections under Division 26, "Electrical."

3.4 FIELD QUALITY CONTROL

A. **Inspection.** Notify and coordinate with the equipment manufacturer in a timely manner in order for the manufacturer to conduct the inspection, servicing, operation, testing, and instruction as required in this specification section.

B. **Site Tests**

1. After each screen has been installed, with the manufacturer's representative, conduct a demonstration in the presence of the OWNER to verify that the equipment operates as specified. Submit a manufacturer's representative report per Section 01 33 00 requirements. The first new screen installed shall operate for two weeks before second existing screen can be removed from service and replaced.

2. Operation. Successfully demonstrate the following:

a. Operation in Remote Mode.

- 1) Operate the screen through a time cycle. Verify that screened material discharge at a predetermined position.
- 2) Change elevation set point to simulate a high level to induce the fine screen to operate continuously.
- 3) Change elevation set point to simulate a second high level to induce the operation of the alarm system.
- 4) Verify the screenings are deposited in the compactor, dewatered, and discharged into the roll-off bin.

b. Operation in Manual Mode.

- 1) Verify operations of start, stop, and jog push buttons.
- 2) Verify operation of emergency stop button.

3. Furnish all materials and equipment required for the demonstration at no additional expense to the Owner.

C. **Manufacturer's Representative.** A qualified representative of the equipment manufacturer shall inspect the completed installation, service the screens and compactors, operate the equipment under all design conditions, and provide the Owner with a written certificate of approval in accordance with Section 01 33 00 "Submittals." The representative shall spend at least one 8-hour day per screen performing the required services and shall submit a manufacturer's representative report as specified in Section 01 33 00.

D. **Defective Work.** If defects are detected, take corrective procedures.

3.5 **ADJUSTING**

Test Results. If the results of the field tests do not show successful operation of the screens or compactors, repair, adjust, or modify the equipment until the tests can be successfully completed reliably.

3.6 **CLEANING AND DISPOSAL**

- A. **Cleaning.** Clean in accordance with Section 01 74 23 "Cleaning."
- B. **Disposal.** Remove from the job site and, as necessary safely dispose of, all excess materials and debris resulting from all work completed under this section (including testing). Dispose in accordance with Section 01 74 23 "Cleaning."

3.7 **PROTECTION**

- A. **Requirements.** Protect the fine screens and associated equipment and materials after installation, but prior to acceptance by the Owner. Protection of the equipment shall include provisions during installation and testing of nearby piping, valving, and other adjacent equipment. Remove all protective measures installed at completion and acceptance of the project.

3.8 **INSTRUCTION OF OPERATING PERSONNEL**

- A. **Training.** Training shall be conducted in accordance with Section 01 79 00 "Start-up, Demonstration, and Training" and shall include all equipment specified in this section and all related electrical and instrumentation equipment. One training session shall be conducted. Training session shall include hands-on demonstration of the equipment and shall be for a minimum of 4 hours.

PART 4 - EQUIPMENT SCHEDULE

| | |
|---|-----------------------|
| Type of Service | Raw Domestic Sewage |
| Location | Pretreatment Building |
| Number of Bar Screens and Compactors | 2 each |
| Average Daily Flow | 6 mgd |
| Peak Flow | 29 mgd |
| Channel Width | 5 ft |
| Channel Depth | 7 ft |
| Maximum Water Level | 5 ft |
| Debris Discharge Height Above Operating Floor Level | 4 ft |
| Maximum Size of Clear Opening between Perforations | 1/4 inch (6 mm) |
| Inclination Angle of Screen | 75 degrees |
| Maximum Lift Capacity | 0.7 cy/hr |
| Maximum Overall Height Above Operating Floor Level | 9 ft |

END OF SECTION

SECTION 44 32 30

SECONDARY CLARIFIERS 1 AND 2

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; and all other related specification sections, apply to this section.
- B. **Electric motors shall** be furnished as part of the work of this section and shall conform to all applicable portions of Division 26.
- C. **Instrumentation and control work**, except as specified herein, is included in Division 40. Instrumentation and controls provided in this section shall adhere to Instrumentation and Control Specifications Sections in Division 40.

1.2 DESCRIPTION OF WORK

- A. **The Contractor** shall provide all labor, tools, equipment, materials, and manufacturer's services necessary to furnish and install, in proper operating condition, two complete circular clarifier mechanisms installed in existing concrete settling tanks, as specified herein and as shown on the drawings as Secondary Clarifiers 1 and 2.
- B. **Scope of Clarifiers 1 and 2** shall include center drive mechanisms, center columns, cages, influent wells, rotating rapid sludge removal headers, surface skimmers and scum troughs, effluent weirs and baffles, weir and baffle brush cleaners, spare parts, and appurtenances. Each sludge collecting mechanism shall be a center pier supported, siphon feed type with peripheral overflow.
 - 1. Motor starters shall be provided for the clarifiers under Division 26.
- C. **Each collector** header shall quickly move settled activated sludge to the center of each clarifier while simultaneously producing a clear effluent which averages less than 12 mg/l total suspended solids.
- D. **The Contractor** shall furnish the manufacturer's services as specified in Division 1 and as specified herein.
- E. **The equipment and system** shall be successfully tested as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes.** Perform all work in compliance with all federal, state, and local codes.

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- B. **Standards.** Materials and workmanship shall be in accordance with the following standards:
1. AFBMA- Antifriction Bearing Manufacturers Association.
 2. AGMA - American Gear Manufacturers Association.
 3. AISC - American Institute of Steel Construction.
 4. AISI American Iron and Steel Institute.
 5. ANSI - American National Standards Institute.
 6. ASTM - American Society for Testing Materials.
 7. AWS - American Welding Society.
 8. IEEE - Institute of Electrical and Electric Engineers.
 9. NEMA - National Electrical Manufacturers Association.
 10. SSPC – Steel Structures Painting Council.
 11. UL - Underwriters' Laboratories, Inc.
- C. **Regulatory Agencies.** Perform all work in compliance with the requirements of the following regulatory agencies:
1. OSHA - Occupational Safety and Health Administration.
- D. **Manufacturer.** The secondary clarifier equipment shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of the equipment to be furnished. All equipment and items specified herein shall be obtained from a single manufacturer who shall be solely responsible for the design of the entire sludge and scum collectors, gear reducer, appurtenances, and all component warranties. The base bid equipment shall be as manufactured by:
1. Evoqua Water Technologies, Waukesha, Wisconsin.
- As indicated in the Bidding Documents, other manufacturers will be considered, including:
1. Envirodyne Systems, Camp Hill, Pennsylvania.
 2. Kusters-Water of Spartanburg, South Carolina.
 3. Ovivo USA of Salt Lake City, Utah.
- E. **All structural steel components** shall conform to the requirements of "Specifications for the Design, Fabrication and Erection of Structural Steel for Building" published by the American Institute of Steel Construction. Except where specifically indicated otherwise, all plates and structural members shall have a minimum thickness of 1/4 inch.
- F. **The equipment manufacturer's** shop welds, welding procedures, welders and welding operators shall be qualified and certified in accordance with the requirements of the latest edition of ANSE/AWS D1.1 "Structural Welding Code - Steel" published by the American Welding Society.

1.4 SUBMITTALS

- A. **Product Data.** Submit manufacturer's product data in accordance with Section 01 33 00 "Submittals," of the equipment and all appurtenances and accessories. Data shall include drive selections and data demonstrating compliance with minimum torque ratings.
- B. **Installation List.** Provide installation list of at least five installations with names and phone numbers of similar equipment installed and operating. Show performance data from at least two similar plants meeting the Owner's effluent performance requirements for suspended solids.
- C. **Certified calculations showing compliance** with torque ratings, deflection of structural and other specified members, AGMA service factor and AFBMA B-10 bearing lives.
- D. **Shop Drawings.** Shop drawings shall be submitted to the Engineer/Architect for review. Shop drawings shall be in accordance with Section 01 33 00 "Submittals" and shall show dimensional layouts and clearances, anchor bolts, sectional and plan views of collector construction, complete assembly drawing, type of material, dimensions and thicknesses of each element, driver calculations, equipment specifications, structural design calculations, weights, installation and operation instructions, bill of materials, coatings, and warranties. Drive calculations shall be certified by a registered professional engineer.
- E. **General arrangement** of drive unit verifying AGMA ratings, overload protection construction, housing material and horsepower.
1. Give values used for the following design parameters per AGMA 6034-B92:
 - a. Pitch diameter of worm and worm gear (inches)
 - b. Effective face width of gear (inches)
 - c. Lead angle of threads (degrees) at mean worm diameter
 - d. Normal pressure angle of worm thread (degrees)
 - e. Sliding velocity of worm at mean worm diameter (fpm)
 - f. Service factor. Use 1.25
 - g. Materials factor (Ks)
 - h. Overall efficiency of speed reducer (percent)
 2. Give the following values per AGMA 2001-C95
 - a. Pitch diameter of pinion and spur gear (inches)
 - b. Face width of narrowest of two mating gears (inches)
 - c. Pitch line velocity of pinion (fpm)
 - d. Allowable bending stress (SAT) of pinion and spur gear material (psi)
 - e. Allowable contact stress (SAC) of pinion and spur gear material (psi)

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- f. Geometry factor (J) for bending stress
 - g. Geometry factor (I) for pitting resistance
 - h. Load distribution factors CM and KM
 - i. Dynamic factors CV and KV
 - j. Stress cycle factors CL and KL
3. Include the following AFBMA B-10/L-10 calculations provided by the clarifier supplier substantiating the life rating of the main bearing. The calculations shall include:
- a. No. of balls (Z)
 - b. Total hanging weight of equipment (Ft)
 - c. Rotational speed (rpm)
 - d. Raceway hardness factor (fh)
 - e. Weibull exponent (e)
 - f. Nominal contact angle (a)
 - g. Thrust and radial raceway material factor (fcm)
 - h. Pitch diameter (dpw)
 - i. Ball diameter (dw)
- F. **Motor Test.** A certified report of the motor tests shall be submitted to the Engineer/Architect for acceptance.
- G. **Operation and Maintenance Manuals.** Operation and Maintenance (O&M) manuals shall be submitted to the Engineer/Architect in accordance with Section 01 33 00 "Submittals" of these specifications. The initial review copy of the O&M manual and final revised copies shall be submitted prior to delivery of the equipment.
- H. **Material Certification.** Manufacturer's material verifications and hardness certification for main bearing strip liners, to include 5 independent test samples in accordance with ASTM-A370.
- I. **Operator Training Information.** Operator training data, in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and operator training lesson plans, in accordance with Section 01 33 00 "Submittals," shall be submitted with the two revised final copies of the O&M manuals.
- J. **Personnel Qualifications.** Qualification statements, in accordance with Section 01 33 00 "Submittals," of all manufacturer's representative personnel that will be servicing the equipment or conducting the operator training sessions shall be submitted with the two revised final copies of the O&M manuals.
- K. **Storage Requirements.** Submit storage requirements as specified in Section 01 60 00, "Materials and Equipment."
- L. **Manufacturer's Representative Reports.** Manufacturer Representative reports shall be submitted in accordance with Section 01 79 00 "Start-Up, Demonstration, and Training." Produce and material certifications and

inspection data as specified in Section 01 33 00 "Submittals," shall be included with this report.

- M. **Site Test Reports.** Proposed Site Testing procedures shall be submitted at least three weeks prior to the proposed site testing date for Engineer/Architect approval. Test reports in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and shall be submitted to the Engineer/Architect.

1.5 JOB CONDITIONS

A. Environment Requirements

1. Climatic Conditions. The secondary clarifier equipment shall be designed for operation in an outdoor installation with exposure to the locally variable climatic conditions, including temperature and weather conditions.

B. Process Conditions for Clarifiers 1 and 2

1. Each clarifier shall be capable of processing the wastewater flow rates as shown in the schedule and produce an effluent with a 30-day average total suspended solids concentration of less than 12 mg/l and a seven-day maximum total suspended solids concentration of less than 15 mg/l. The process water to be clarified is a mixture of activated sludge and treated wastewater as shown in the schedule.
2. Each clarifier shall be designed for separation of suspended solids as well as scum and floating material from mixed liquor suspended solids. Incoming flow will discharge first into an energy dissipating well, then into a feedwell, and settled solids will be collected by a rapid sludge removal header and moved toward the sludge withdrawal manifold at the center of the tank for discharge via the sludge pipeline.
3. Each clarifier shall remove sludge to the center hopper quickly, so that the sludge in the tank will not denitrify and portions of it rise to the surface when the process flow to the clarifiers has a dissolved oxygen concentration of 1.5 mg/l or greater.
4. Each clarifier mechanism shall be capable of producing a withdrawn sludge concentration of 10,000 mg/l (TSS) or greater, with less than 2 feet of sludge stored in the clarifier.

1.6 DELIVERY, STORAGE AND HANDLING

- A. **General.** The delivery, storage, and handling of the clarifier equipment shall be in accordance with Section 01 60 00 "Materials and Equipment," and the manufacturer's instructions.
- B. **Fabricated assemblies** shall be shipped in the largest sections permitted by carrier regulations, properly matched-marked for ease of field erection.

- C. **All components** shall be erected immediately upon receipt from the clarifier manufacturer or stored in strict conformance with storage recommendations provided by the clarifier manufacturer in the operations and maintenance manual.
- D. **Each mechanism** shall be lubricated in strict accordance with the instructions of the clarifier manufacturer's field service representative. The required lubricants shall be provided by the Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

- A. **Design.** All parts of the mechanisms shall be of ample strength to withstand all stresses that may occur either during operation, fabrication, shipping, or erection. The clarifier mechanism will be used to sweep new grout over the existing tank floor, it shall have sufficient strength to do so under its own power. Mechanisms shall be designed for continuous operation. All underwater structural steel shall have a minimum 1/4-inch thickness unless noted otherwise. Minimum angle size shall be 2 inches x 2 inches x 1/4 inch. Connections shall be shop welded or field bolted. Field welding will not be permitted except for the bridge splice. All steel structural components shall be designed so that stresses developed do not exceed allowable stresses, as defined by current AISC Standards when designed for the peak torque. The complete machine shall be of sufficient strength, as necessary, to sweep in 2 inches of grout on the tank bottom under its own power. Such grouting shall be done in strict accordance with the manufacturer's instructions.
- B. **Performance.** The equipment shall comply with the performance and design requirements specified in Paragraph 1.5 - "Job Conditions", and the schedule.
 - 1. **Steel.** All structural steel shall conform to Standard Specifications for structural steel for bridges and buildings, ASTM A36 and A992. All steel plates shall conform to ASTM A283C requirements. Any ductile iron used shall comply with ASTM A536 requirements. All plates and structural member for submerged service shall have a minimum thickness of 1/4 inch, unless otherwise stated.
- C. **Materials**
 - 1. **Steel.** All structural steel shall conform to the Standard Specifications for structural steel for bridges and buildings, ASTM A36. All plates and structural members for submerged service shall have a minimum thickness of 1/4 inch, unless otherwise stated.
 - 2. **Castings.** All castings shall conform to ASTM A48, Standard Specifications for gray iron castings and shall have a minimum tensile strength of 30,000 pounds per square inch (psi). All castings shall be free of warp, fins, gas and pit holes, and other defects that might impair strength or appearance.

3. Fastening. All parts of the clarifier mechanism attached to the tank shall be fastened with stainless steel Type 316 anchor bolts, with necessary hex nuts and washers. All fasteners for the mechanism shall be ASTM A325 high strength. Handrail bolts shall be Type 304 stainless steel.
4. Welding. All welding shall be in accordance with the standards of the American Welding Society.
5. Electrical. See Electrical Division.

2.2 MANUFACTURED EQUIPMENT

- A. **General.** Clarifiers 1 and 2 shall be of the full-bridge, center column, center inlet feed, and peripheral overflow type, with a central driving mechanism which shall support the center feed well and rotate a center cage with two scum skimmers, one rapid sludge removal header, and one counterbalancing truss.

The sludge removal header for each clarifier, as shown on the drawings, attached to the truss support shall be arranged to move sludge that settles on the tank bottom to a concentric sludge ring at the center of each tank. The speed of the mechanism shall be as shown on the schedule. The clarifier mechanism shall be so designed that there will be no chains, sprockets, bearings, or operating mechanism below the liquid surface or in contact with the liquid.

B. Center Drive Mechanisms

1. General. Each drive mechanism shall be completely factory assembled and shall consist of a primary gear reduction unit, an intermediate reduction unit, plus a final reduction unit consisting of a pinion and internal gear enclosed in a turntable base. All gearing shall be enclosed in gray cast iron ASTM A-48, Class 30-A or ASTM A-36 steel housings. Exposed gearing will not be considered.
2. Drive components shall be located via a machined, registered fit to preserve the alignment of key drive components under all load conditions. Inspection of the completed drive unit shall be accomplished at the clarifier manufacturer's shop, with reports of all tests and certifications of material hardness being made available for review at the Engineer's request prior to shipment to the job site.
3. Major drive components, main gears and bearings shall be designed to allow for separate and individual replacement by plant personnel to facilitate quick and economical repairs.
4. Each complete center drive assembly, including the overload protection device, shall be a regularly manufactured in-house product of the clarifier manufacturer. Drive assemblies purchased from third party vendors will not be accepted.
5. Primary Reduction Units
 - a. The primary reduction unit shall be a heavy duty helical gear reducer.
 - b. All bearings shall be anti-friction type and running in oil in a cast iron housing. Bearing life shall have an AFBMA B-10

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bearing life exceeding 200,000 hours. Lubrication fittings shall be readily accessible. An oil sight glass, fill pipe, and drain line shall be provided.

- c. The primary reduction gear reducer shall drive the intermediate reduction unit through a chain and sprocket arrangement. The drive chain shall be No. 80L self-lubricated roller chain and be covered with a Type 304 stainless steel OSHA approved removable guard. Proper chain tension shall be provided for by an adjustable steel base mounted on the intermediate reduction unit. Sprockets and chain shall be designed for the connected horsepower of the drive with a minimum service factor of 4.0.
- d. Proper chain tension shall be provided for by an adjustable steel base mounted on the intermediate reduction unit.

6. Intermediate Reduction Units

- a. The intermediate reduction unit shall be heavy-duty, worm gear speed reducer in a gray cast iron housing, with grease and oil lubricated anti-friction type bearings. The unit shall be mounted on a machined face on the top of the final reduction unit and properly aligned to maintain accurate centers for the final reduction gearing.
- b. The housing shall be constructed of ASTM A48 cast iron. The worm shall be constructed of AISI 4142 heat treated steel, and the worm gear of centrifugally cast Herculoy bronze. The housing shall be constructed of ASTM A48 cast iron or equal. The worm shall be constructed of AISI 4142 heat treated steel, from 8620 alloy steel, hardened and carbonized or of centrifugally cast high strength manganese bronze. The worm and worm gear shall be designed based upon AGMA 6034 for the specified torque.
- c. A single-piece or two-piece pinion and shaft shall be keyed to the worm gear to transmit power from the worm gear to the spur gear.
- d. In order to maintain proper alignment between the pinion and the spur gear, the pinion shall be supported by bearings both above and below the spur gear. The bearing shall be fitted into precision machined bearing pilots to positively insure bearing and gear alignment. Bearing life shall have an AFBMA -10 bearing life of at least 50,000 hours.

7. Final Reduction Units

- a. The final reduction unit shall be secured to the turntable base and shall consist of a main gear and a pinion mounted in a ASTM A48 Class 30A cast iron or ASTM A-36 steel housing with a removable steel cover plate and Neoprene dust seals. The base plate on which the gear/bearing is mounted shall have a minimum thickness of 1.50 inches. The surface on which the

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- gear/bearing is mounted shall be machined flat within 0.008 inches. The steel plate to which the intermediate pinion drive gear box is mounted shall have a minimum thickness of 1.00 inches. The top of the final reduction housing may provide a center platform to allow adequate access to the drive unit and have clearances as shown on the plans.
- b. The internal final gear shall be driven by a heat-treated steel pinion and shall be mounted on the output shaft of the intermediate reduction unit. The gear teeth shall be made of AGMA Grade 5 or higher. The gear material shall be ductile modular iron per ASTM A-536, through hardened to 200 to 260 or AISI 4150 steel. Brinell hardness as cast and shall be induction hardened to a hardness of 54-60 Rc. The main gear shall have a deep face height of 6 inches or larger as required by AGMA 2001 and the gear teeth shall be hardened to at least 278 BHN.
 - c. Spur pinion shall be 4140 or 4340 heat treated alloy steel. Spur pinion shall be keyed to a heat-treated alloy steel shaft. No welding will be acceptable on the spur gear or its shaft.
 - d. The main gear shall rotate and be supported on a ball bearing assembly provided with four replaceable liner strips fitted into the main gear and turntable base. Liner strips shall be special vacuum degassed, carbon corrected, alloy steel hardened to a Rockwell hardness of at least 43 to 46 Rc. The strip liner design shall be such that the B-10 life of the liner is a minimum of 20 years based on the specified mechanism speed and a uniformly distributed load on the rotating mechanism. Alternatively, the main gear shall rotate and be supported on a ball bearing assembly provided with a four-point contact precision raceway with B-10 bearing life of at least 100 years.
 - e. Ball bearings shall be AFBMA Grade 500 or SAE 52100, 58 Rockwell Hardness, minimum diameter of 1 inch. Provide nylon spacers located between ball bearings, where applicable.
 - f. The turntable base shall be bolted to the center column and the turntable base and internal gear shall be designed to support rotating mechanism, access bridge, and center cage. Each turntable base shall be designed with a full side wall, to provide a secure oil bath compartment.
 - g. The main gear and pinion shall be lubricated by means of an oil bath and the meshing action of the pinion and internal gear shall force lubricant up the face of the teeth. The internal gear, pinion, and ball race shall run in an oil bath and be protected by a felt seal and steel dust shield. Lubrication fittings shall be readily accessible. An oil sight glass, fill pipe, and valved drain line shall be provided. Provide a minimum of 2-inch-deep oil reservoir below the bottom of the bearing. The drive unit housing shall be designed with a separate condensate collection compartment of a minimum 3-inch depth. The condensate collection compartment shall encircle the drive base, shall be located away from all bearings, and shall be located at the lowest

- points in the drive base. Provide valved condensate drain connection.
- h. The drive mechanism shall be designed in accordance with AGMA Sections 2001-C95 (January 1995), "Fundamental Rating. Factors and Calculation Methods for Involute Spur and Helical Gear Teeth"; and 6034-B92 (February 1992), "Practice for Enclosed Cylindrical Worm Gear Speed Reducers and Gearmotors"; for 24-hour continuous duty, and 20-year design gear life, based on the AGMA rated torque. Main gear set service factor shall be a minimum of 1.25 based on continuous running torque. The momentary peak strength (bending strength) of the Final Reduction Unit shall be a minimum of 200 percent of specified continuous design running torque. All bearings shall be designed for a minimum B-10 life of 200,000 hours.
 - i. All bolts, nuts, washers, etc. for the final reduction unit shall be Type 316 stainless steel.
 - j. The AGMA rated torque of the drive shall be the lowest value computed for worm gear, spur gear, and pinion for strength and durability.

C. Torque Protection

- 1. To provide adequate protection, all parts of the collecting mechanism shall be designed to withstand a momentary peak torque of 1.65 times the cut-out torque without permanent deformation.
- 2. To protect against failure of the center drive mechanism, all parts of the drive mechanism shall be designed to withstand a momentary peak load of 2.00 times the cut-out torque.
- 3. The drive units shall be protected by a shear pin device set for 130 percent of the rated continuous running design torque.
- 4. Torque Overload Alarm. The electro-mechanical overload alarm shall be mounted to the drive unit at the thrust end of the worm shaft and shall consist of a disc spring or compression spring assembly, gear rack and pinion, a torque indicator dial visible through a Plexiglas window, two micro switches, and a terminal block all enclosed in a weatherproof NEMA 4X cast aluminum or cast iron housing.
 - a. The indicator dial shall be 0 to 130 percent of continuous running design torque.
 - b. The thrust of the worm shaft against the disc springs shall actuate the gear rack and pinion, micro switches, and indicator dial in direct proportion to the operating torque.
 - c. A 120 volt space heater shall be provided in the weatherproof housing for condensate control.
 - d. The torque overload alarm device shall be micro switches set at the following capacities and designed to interface with the motor control center starter compartment circuit:

- 1) One torque switch to indicate an alarm when the load on the mechanism reaches 85-percent of the continuous running design torque capacity of the drive, and indicate an alarm.
- 2) One torque switch to stop the motor when the load reaches 100-percent of the continuous running design torque capacity, and indicate alarm.
- 3) One torque switch to Stop the motor when a shear condition is reached, and indicate an alarm.

D. Drive Assemblies

1. The motor shall be rated at 1,800 rpm, squirrel cage, induction type, totally enclosed, fan cooled, ball bearing, continuous duty, 104 degrees F (40 degrees C) ambient, 1.15 service factor, Class F insulations, of ample power for starting continuously operating the unit without overloading. The motor shall conform to NEMA standards and be name plated for operation on 460 volt, 3 phase, 60 hertz current.
2. A motor high temperature switch shall be provided in stator winding and bring lead up to terminal block.

E. Access Bridges

1. Each access bridge shall extend from the tank wall to the drive and onto the opposite tank wall. Each bridge shall be supported by an open walk-thru truss or beams. The walkway surface shall be non-skid, serrated aluminum grating. Handrail shall be aluminum, three-rail complete with kick plate, and shall be provided along the access bridge and around the center drive mechanism. All handrail assemblies shall meet all applicable codes and be as specified in Section 05 52 13, "Pipe and Tube Railings." Adequate walkway and access area shall be provided around center drive unit. A minimum clearance of 24 inches around the center drive components shall be provided.
2. The access bridge and walkway shall be designed to support all dead loads plus a live load of not less than 150 pounds per lineal foot with a deflection less than 1/360 of the span.

F. Center Columns, Cages, and Influent Wells

1. Center Columns. A cylindrical steel center pier, of minimum diameter of 30 inches, shall support the drive, collector mechanism, and access bridge. The top of the pier shall have a drive mechanism mounting plate which shall be set plumb with the centerline. The drive mechanism shall be positioned, shimmed, leveled, and bolted in place as directed by the manufacturer and approved by the Engineer/Architect. The center pier shall be fabricated of 1/4 inch thick steel and be securely anchored with L-type or straight cast in place anchor bolts. The Contractor shall obtain a steel template from the manufacturer to accurately locate these anchor

- bolts. The center pier shall serve as an influent pipe and shall have a minimum of four large inlet areas at its upper end to diffuse flow into the influent well at a velocity not to exceed 1 fps at maximum flow.
2. Center Cages. A steel center cage shall be hung from the internal gear, shall be at least 3 feet 0 inches square, constructed of 1/4 inch minimum structural members and shall support and rotate the rake arms. Connection to internal gear shall be adjustable for proper alignment and allowance for structural steel tolerances.
 3. Energy Dissipating Inlets (EDI). The EDI shall be fabricated out of minimum 1/4 inch steel plate. EDIs shall be either LA-EDI type, FEDWA Baffle Type, or EquaFlow 360-type.
 4. Influent Wells. An influent well, supported from the center cage, shall be provided to diffuse the liquid into the tank without disturbance. The influent well shall be 18 feet 0 inches in diameter and project 6 feet 0 inches below the liquid level. The influent well shall be fabricated from 0.060 inch thick corrugated acrylated fiberglass panels with ultraviolet protection attached to a structural steel frame with stainless steel fasteners. Alternatively, the influent well may be constructed of 3/16 inch or 1/4 inch thick A36 steel. The structural steel frame shall be supported from the center cage. The influent well shall project above water level and shall be provided with six 1 foot 0 inch wide by 6 inch deep baffled scum ports at liquid level to permit escape of floating material. Holes shall be cut in the panels as shown on the plans for the purpose of aiding in even flow distribution.

G. Sludge Collection Header

1. The header shall be parallel to the tank floor and have a series of inlet orifices such that the entire tank bottom is swept clean in a single revolution.
2. The header shall be designed to uniformly remove sludge in proportion to the area swept with the removal of a larger volume of sludge at greater distances from the tank center.
3. Sludge shall be transported through the header to the center manifold, with removal being accomplished by hydrostatic pressure.
4. Provide a fully tapered, rectangular-shaped header varying in cross section from a maximum near the tank center to a minimum at the outer wall.
5. Fabricate header from 1/4-inch thick steel plate and hot-dip galvanized after fabrication. Provide steel plate counterweights not exceeding 50 pounds each as necessary for proper equipment balance. Field welding of galvanized header or supports will not be allowed.
6. Longitudinal cross-sectional axis to be mounted at an angle of 45 degrees to tank bottom to trap sludge.
7. Provide a 2 inch fluidizing vane as an integral part of header. Attach neoprene squeegee to fluidizing vane provided with 1 inch vertical adjustment.
8. Manufacturer to size and space header inlet orifices at regular intervals not exceeding 30 inches.

9. Orifice design to be proportionate to the volume of sludge withdrawn from the entire tank floor at all flows.
10. Provide header flange with silicone seal for bolted connection to center manifold. Header shall be tie-bar supported.
13. Truss arm shall be furnished with a triangular three-point contact design for ease of installation and alignment. Truss shall be constructed with 1/4-inch minimum thick members. Truss shall be pinned at the base for vertical adjustment and connected to the center cage through strut and adjustable clevis assembly. Tie-rod and turnbuckle designs that do not provide lateral support shall not be acceptable.
14. Provide a cylindrical manifold with two seals for bolted connection to the sludge collection header and bottom of cage. A bottom seal plate shall be furnished by the equipment manufacturer securely anchored to the floor and grouted in place after final adjustment.

H. Surface Skimmers, Blades, and Scum Troughs

1. For each clarifier, two full surface skimmers shall be provided and installed to sweep the surface of the sedimentation part of the final clarifiers, automatically removing scum and floating material into a scum box at the periphery of each tank.
2. Each full surface skimmer shall consist of a scum blade supported from the influent well and structural "A" frames mounted on top of the truss arm. Provide a scum transport angle matching the full-radius scum trough and pivoting wiper assembly attached to the outer end of the scum blade to form a scum-trapping pocket. The mechanism shall insure continual contact and proper alignment between wiper blade, scum baffle, and beach as the blade travels up the beach incline. Each wiper blade shall have a wearing strip on its outer end which contacts the scum baffle and a neoprene strip on its lower and inner edge. Scum shall be trapped as wiper blades meet the skimmer blade ramp, raised along the beach, and deposited into the scum trough. Skimmers which rely on support from the scum baffle will not be acceptable.
3. Scum trough and beach components shall be fabricated from 1/4-in thick steel plate, and adequately supported from the scum baffle along the tank wall and the influent well. The full-radius scum trough shall be nominally 21-ft long, with a length of at least 2'-6" along the scum baffle, as shown on the drawings. The inner edge of the trough shall be furnished with a 1/4-in thick steel baffle plate extension to entrap additional scum. A 6-in standard pipe flange shall be provided for connection to the scum discharge piping, and scum piping tied into the existing scum well shown on the drawings.
4. Flush Valve. Obtain from equipment manufacturer for flushing the scum box automatically; design so that approximately 2 to 25 gallons of clarifier water to enter the box as the scum scraper passes over the box opening; include a lever arm, hinged valve with seal and counter weights (as required) and necessary piping.
5. Inner scum baffle shall be extended an additional 12 inches lower in the area adjacent to the scum box to minimize solids carry-over due to turbulence caused by the scum scraper contacting the scum box. The

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area where the scum baffle will be extended, will be from 4 feet 0 inches upstream of the scum box to 3 feet 0 inches downstream of the scum box.

- I. **Effluent Weirs and Baffles.** The 1/4 inch thick fiberglass effluent weir and scum baffle located on the periphery of the clarifier shall be provided as shown on the drawings and specified in Section 13 00 50, "Fiberglass Weirs and Baffles." The Contractor is not required to obtain the effluent weirs and baffles from the manufacturer of the collectors.

- J. **Weir, Baffle, and Launder Cleaning System.** Each clarifier shall be fitted with a multi-brush cleaning system that will keep effluent weir, scum baffle, and concrete launder surfaces clear of scum and algae accumulations. Each cleaning system shall consist of at least four spring-loaded brushes on Type 304 stainless steel arms and support that interconnects with each clarifier’s skimmer arm. Brushes shall be specifically designed for municipal wastewater service and outdoor service with UV protection. Cleaning system shall be Weir-Wolf by Ford Hall Company, or equal.

- K. **Anchor Bolts.** All equipment anchor bolts shall be Type 316 stainless steel, furnished by Equipment Manufacturer, and of ample size and strength for the purpose intended. All anchor bolts shall be set by the Contractor in accordance with the manufacturer's instructions.

- K. **Control.**
 - 1. Manufacturer Provided Controls
 - a. Torque switches as specified in herein.

 - 2. Manual Control
 - a. Plant staff will manually turn mechanism on and off at the motor control center.

 - 3. SCADA System Monitoring
 - a. Torque overload alarm and shut down will be monitored and alarmed.

2.3 ACCESSORIES

- A. **Provide 120 volt space heater** as specified herein.

2.4 SPARE PARTS

- A. **Provide the following Clarifiers 1 and 2 spare parts** to the Owner, boxed, marked, and ready for long term storage.

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1. One set of neoprene skimmer wipers for each mechanism.
 2. One set of oil sight glasses or dip stick.
 3. One oil change supply for summer viscosity (two clarifiers).
 4. One oil change supply for winter viscosity (two clarifiers).
- B. **Provide any parts** that are defective or wear out within the first two years of equipment operations; the time period beginning at the acceptance of this equipment.
- C. **Special Tools**
1. Deliver to Owner in same manner as extra materials.
 2. Include tools that are required to assemble, disassemble, repair and maintain equipment, and that have been specifically made for use on equipment.
 3. Include necessary hooks and rods for handling equipment parts that are not permanently attached with each tool set.
 4. Special tools shall be marked or tagged as to the purpose.
 5. Include list of tools with the maintenance and operation data describing the uses of tools.
 6. Neatly mount each set of tools, eyebolts, hooks, and rods in box with hinged cover, suitable for wall mounting.

2.5 FINISHES

- A. **Shop Primed.** Shop priming of wetted and non-wetted parts shall be as specified in Section 09 90 00 "Painting." All non-submerged steel shall be sandblasted to SSPC-SP-6 specifications and given one coat of manufacturer's epoxy primer 2-3 MDFT. All submerged steel shall be sandblasted to SSPC-SP-10 specifications and given one coat of manufacturer's epoxy primer 2-3 MDFT.
- B. **Drive Shop Finishing**
1. Manufactured mechanical components shall be shop finished as specified in Section 09 90 00 "Painting." The manufacturer's standard paint system will be accepted only if found to be suitable for the service of the equipment installation by the OWNER.
 2. Prior to assembly of the drive unit, the castings shall have been sandblasted and thoroughly cleaned to remove any foreign particles in the drive base. After assembly, the drive mechanism shall be solvent cleaned and power wire brushed as needed prior to application of manufacturer's standard primer.
 3. Gear motors shall be furnished with manufacturer's standard enamel.
- C. **Field Painting.** The mechanism shall be field finish painted as specified in Section 09 90 00 "Painting." Field coating products shall be compatible with shop finished coats previously applied. Obtain equipment manufacturer's permission to apply contractor supplied paints or coatings. Submit evidence of manufacturer's permission to the Engineer/Architect's for approval.

2.6 SOURCE QUALITY CONTROL

- A. **Center Drive Testing.** Each complete drive shall be assembled in the clarifier manufacturer's shop and tested to assure the drive is running properly and to calibrate the drive control. A complete test report shall be sent to the Engineer/Architect verifying that the drive meets the quality assurance of the manufacturer and Engineer/Architect.

2.7 FABRICATION

- A. **Factory Assembly and Marking**
 - 1. Assembly equipment subassemblies to ensure proper fitting of parts. Include complete center column, drive cage and rake arms.
 - 2. Match mark units with erection marks. Dismantled units for shipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Site Verifications of Conditions.** Verify that surfaces and site conditions are ready to receive work and the following conditions:
 - 1. Verify structure dimensions.
 - 2. Concrete is clean and ready for equipment to be placed.
 - 3. Electrical conduit cast-in concrete is properly sized and located.
- B. **Responsibility.** Beginning the installation means the installer accepts the existing surfaces and conditions.

3.2 PREPARATION

- A. **Protection.** Protect adjacent equipment, piping, and valving against damage from the scraper type collector installation where required.
- B. **Manufacturer's Instructions.** Preparatory work in accordance with manufacturer's instructions shall be completed prior to equipment installation.

3.3 INSTALLATION

- A. **Requirements.** Fabrication and installation of the rapid sludge removal type collectors shall be as shown on the drawings, as specified herein, in accordance with the approved shop drawings and the manufacturer's instructions and recommendations. Grouting of the tank shall be as directed by the manufacturer and as approved by the Engineer/Architect. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendation.

B. Interface with Other Items

1. Complete all electrical power and control connection under Division 16, Electrical.

3.4 FIELD QUALITY CONTROL

A. Inspection. It is the Contractor's responsibility to notify and coordinate with the equipment manufacturer in a timely manner in order for them to conduct their required inspection, servicing, operation testing, and instruction as required in this specification section.

B. Site Tests

1. **Methods.** Field tests shall be in accordance with Section 01 79 00, "Start-up, Demonstration, and Testing."
2. **Dry Test.** The scum removal collector shall be tested to show proper operation of the equipment and controls as specified and required.
3. **Torque Test.**
 - a. The purpose of the test shall be to verify the structural integrity of the mechanism and drive, and to verify that the torque protection system and electronics operate as required, and as specified. The equipment manufacturer shall provide a qualified service person to supervise tests.
 - b. The clarifier mechanism shall be field torque tested. The testing shall be carried out under the supervision of the equipment manufacturer before the mechanisms are approved and placed into operation.
 - c. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the Contractor in the tank floor at locations recommended by the manufacturer and the Engineer. A torque load shall be applied to the scraper arm by means of a ratchet lever and cylinder connected to the cable assembly.
 - d. The magnitude of the applied load shall be measured by calculating the torque from the distance of the line of action of each cable to the center line of the mechanism. Readings shall be taken at 40-percent, 85-percent, and 100-percent of design torque value. The test load shall be applied and noted on the torque overload device.
 - e. The manufacturer's serviceperson shall certify that the alarm and motor cut-out torque of the drives as calibrated in the manufacturer's shop are in proper operation to shut down the units as specified.
 - f. This field test shall include checking the operation of warning and drive shut down circuitry.
 - g. All equipment required for the test shall be provided by the manufacturer. After the successful test, the testing equipment shall be returned to the equipment manufacturer.

4. **Wet Test.** The equipment shall be field tested with actual process flow containing design flow and activated sludge concentrations. The equipment shall be demonstrated to collect, transport, and thicken sludge as specified. It shall also be shown to collect and dispose of scum, as specified. Compliance with effluent total suspended solids shall be demonstrated. The testing shall take place for a consecutive two-week period, each week's sampling period being five days length.
- C. **Manufacturer's Representative.** A qualified representative of the equipment manufacturer shall inspect the completed installation, service the equipment, and operate the equipment under all design conditions, instruct the Owner's personnel in proper operating and maintenance procedures, and provide the Owner with a written certificate of approval in accordance with Section 01 33 00 "Submittals." The representative shall spend 16 hours (total for both clarifiers) performing required on-site services and submit a manufacturer's representative report as specified in Section 01 79 00 "Start-Up, Demonstration, and Testing."
- D. **Defective Work.** If defects are detected, it will be the responsibility of the Contractor to take corrective procedures.

3.5 ADJUSTING

- A. **Test Results.** If the results of the dry test and wet test do not show successful operation and sludge and scum removal, the Contractor shall repair, adjust, or modify the equipment according to the manufacturer's instructions at no cost to the Owner until these tests are successfully completed.

3.6 CLEANING AND DISPOSAL

- A. **Cleaning.** Cleaning shall be in accordance with Section 01 74 23, "Cleaning."
- B. **Disposal.** The Contractor is responsible for the removal from the job site, and as necessary, safe disposal of all excess materials, and debris as result of the work completed under this section, including testing procedures. Disposal shall be in accordance with Section 01 74 23, "Cleaning."

3.7 PROTECTION

- A. **Requirements.** The Contractor shall be responsible for provisions to protect the scraper type collector equipment and associated equipment and materials after installation but prior to acceptance by the Owner. Protection of the equipment shall include provisions during installation and testing of nearby piping, valving, and other adjacent equipment. The Contractor shall remove all protective measures installed at completion and acceptance of the project.

3.8 INSTRUCTION OF OPERATING PERSONNEL

- A. **Training.** Training shall be conducted in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and shall include all equipment specified in this section and all related electrical and instrumentation equipment. One course, 8 hours in duration and excluding travel time, shall be provided.

3.9 SECONDARY CLARIFIERS 1 AND 2 EQUIPMENT SCHEDULE

| | |
|---|---------------------------|
| Number | 2 |
| Diameter | 70 feet 0 inches |
| Sidewater Depth | 14 feet 0 inches |
| Tank Bottom Slope | 1/16-inch in 1 foot |
| Flow (into one clarifier) | |
| Design Influent Flow | 1.7 mgd |
| Design Flow w/Maximum Return Sludge | 2.9 mgd |
| Peak Flow | 3.5 mgd |
| Solids Loading (per clarifier) | |
| Maximum | 20 lb/day/ft ² |
| Center Well Dimension | |
| Diameter | 22 feet |
| Height | 6 feet |
| Mechanism Tip Speed | 8 – 12 fpm |
| Shear Pin Torque (130% AGMA Rating) | 28,470 ft-lb |
| Peak Motor Shut-Off Torque | 26,280 ft-lb |
| Alarm Torque (100% AGMA Rating) | 21,900 ft-lb |
| Minimum AGMA Design Running Torque | 21,900 ft-lb |
| Minimum AGMA Continuous Running Torque | 15,000 ft-lb |
| Minimum AFBMA B-10 Bearing Life | 200,000 hrs |
| Minimum Internal Gear Pitch Diameter | 30 inches |
| Minimum Ball Race Diameter | 42 inches |
| Minimum Gear Tooth Height in Final Reduction Unit | 4 inches |
| Minimum Motor Horsepower | 0.5 HP |

END OF SECTION

SECTION 44 32 40

SECONDARY CLARIFIERS 3 AND 4

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; and all other related specification sections, apply to this section.
- B. **Electric motors shall** be furnished as part of the work of this section and shall conform to all applicable portions of Division 26.
- C. **Instrumentation and control work,** except as specified herein, is included in Division 40. Instrumentation and controls provided in this section shall adhere to Instrumentation and Control Specifications Sections in Division 40.

1.2 DESCRIPTION OF WORK

- A. **The Contractor** shall provide all labor, tools, equipment, materials, and manufacturer’s services necessary to furnish and install, in proper operating condition, two complete circular clarifier mechanism drives installed in existing concrete settling tanks and coupled to existing mechanical equipment, as specified herein and as shown on the drawings as Secondary Clarifiers 3 and 4.
- B. **Scope of Clarifiers 3 and 4 improvements** shall include replacement of center drive mechanism and appurtenances.
- C. **The Contractor** shall furnish the manufacturer’s services as specified in Division 1 and as specified herein.
- D. **The equipment and system** shall be successfully tested as specified herein.

1.3 QUALITY ASSURANCE

- A. **Codes.** Perform all work in compliance with all federal, state, and local codes.
- B. **Standards.** Materials and workmanship shall be in accordance with the following standards:
 - 1. AFBMA- Antifriction Bearing Manufacturers Association.
 - 2. AGMA - American Gear Manufacturers Association.
 - 3. AISC - American Institute of Steel Construction.
 - 4. AISI American Iron and Steel Institute.
 - 5. ANSI - American National Standards Institute.
 - 6. ASTM - American Society for Testing Materials.

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7. AWS - American Welding Society.
8. IEEE - Institute of Electrical and Electric Engineers.
9. NEMA - National Electrical Manufacturers Association.
10. SSPC – Steel Structures Painting Council.
11. UL - Underwriters' Laboratories, Inc.

C. **Regulatory Agencies.** Perform all work in compliance with the requirements of the following regulatory agencies:

1. OSHA - Occupational Safety and Health Administration.
2. **Manufacturer.** The secondary clarifier drive equipment shall be furnished by a manufacturer who is fully experienced, reputable, and qualified in the manufacture of the components to be furnished. All equipment and items specified herein shall be obtained from a single manufacturer who shall be solely responsible for the design of the drive components. The base bid equipment shall be as manufactured by Evoqua Water Technologies of Waukesha WI.

D. **All structural steel components** shall conform to the requirements of "Specifications for the Design, Fabrication and Erection of Structural Steel for Building" published by the American Institute of Steel Construction. Except where specifically indicated otherwise, all plates and structural members shall have a minimum thickness of 1/4 inch.

E. **The equipment manufacturer's** shop welds, welding procedures, welders and welding operators shall be qualified and certified in accordance with the requirements of the latest edition of ANSE/AWS D1.1 "Structural Welding Code - Steel" published by the American Welding Society.

1.4 SUBMITTALS

- A. **Product Data.** Submit manufacturer's product data in accordance with Section 01 33 00 "Submittals," of the equipment and all appurtenances and accessories. Data shall include drive selections and data demonstrating compliance with minimum torque ratings.
- B. **Installation List.** Provide installation list of at least five installations with names and phone numbers of similar equipment installed and operating. Show performance data from at least two similar plants meeting the Owner's effluent performance requirements for suspended solids.
- C. **Certified calculations showing compliance** with torque ratings, deflection of structural and other specified members, AGMA service factor and AFBMA B-10 bearing lives.
- D. **Shop Drawings.** Shop drawings shall be submitted to the Engineer/Architect for review. Shop drawings shall be in accordance with Section 01 33 00 "Submittals" and shall show dimensional layouts and clearances, anchor bolts, sectional and

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plan views of collector construction, complete assembly drawing, type of material, dimensions and thicknesses of each element, driver calculations, equipment specifications, structural design calculations, weights, installation and operation instructions, bill of materials, coatings, and warranties. Drive calculations shall be certified by a registered professional engineer.

- E. **General arrangement** of drive unit verifying AGMA ratings, overload protection construction, housing material and horsepower.
1. Give values used for the following design parameters per AGMA 6034-B92:
 - a. Pitch diameter of worm and worm gear (inches)
 - b. Effective face width of gear (inches)
 - c. Lead angle of threads (degrees) at mean worm diameter
 - d. Normal pressure angle of worm thread (degrees)
 - e. Sliding velocity of worm at mean worm diameter (fpm)
 - f. Service factor. Use 1.25
 - g. Materials factor (Ks)
 - h. Overall efficiency of speed reducer (percent)
 2. Give the following values per AGMA 2001-C95
 - a. Pitch diameter of pinion and spur gear (inches)
 - b. Face width of narrowest of two mating gears (inches)
 - c. Pitch line velocity of pinion (fpm)
 - d. Allowable bending stress (SAT) of pinion and spur gear material (psi)
 - e. Allowable contact stress (SAC) of pinion and spur gear material (psi)
 - f. Geometry factor (J) for bending stress
 - g. Geometry factor (I) for pitting resistance
 - h. Load distribution factors CM and KM
 - i. Dynamic factors CV and KV
 - j. Stress cycle factors CL and KL
 3. Include the following AFBMA B-10/L-10 calculations provided by the clarifier supplier substantiating the life rating of the main bearing. The calculations shall include:
 - a. No. of balls (Z)
 - b. Total hanging weight of equipment (Ft)
 - c. Rotational speed (rpm)
 - d. Raceway hardness factor (fh)
 - e. Weibull exponent (e)
 - f. Nominal contact angle (a)
 - g. Thrust and radial raceway material factor (fcm)
 - h. Pitch diameter (dpw)
 - i. Ball diameter (dw)

- F. **Motor Test.** A certified report of the motor tests shall be submitted to the Engineer/Architect for acceptance.
- G. **Operation and Maintenance Manuals.** Operation and Maintenance (O&M) manuals shall be submitted to the Engineer/Architect in accordance with Section 01 33 00 "Submittals" of these specifications. The initial review copy of the O&M manual and final revised copies shall be submitted prior to delivery of the equipment.
- H. **Material Certification.** Manufacturer's material verifications and hardness certification for main bearing strip liners, to include five independent test samples in accordance with ASTM-A370.
- I. **Operator Training Information.** Operator training data, in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and operator training lesson plans, in accordance with Section 01 33 00 "Submittals," shall be submitted with the two revised paper copies of the O&M manuals.
- J. **Personnel Qualifications.** Qualification statements, in accordance with Section 01 33 00 "Submittals," of all manufacturer's representative personnel that will be servicing the equipment or conducting the operator training sessions shall be submitted with the two revised paper copies of the O&M manuals.
- K. **Storage Requirements.** Submit storage requirements as specified in Section 01 60 00, "Materials and Equipment."
- L. **Manufacturer's Representative Reports.** Manufacturer Representative reports shall be submitted in accordance with Section 01 79 00 "Start-Up, Demonstration, and Training." Produce and material certifications and inspection data as specified in Section 01 33 00 "Submittals," shall be included with this report.
- M. **Site Test Reports.** Proposed Site Testing procedures shall be submitted at least three weeks prior to the proposed site testing date for Engineer/Architect approval. Test reports in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and shall be submitted to the Engineer/Architect.

1.5 **JOB CONDITIONS**

A. **Environment Requirements**

- 1. **Climatic Conditions.** The secondary clarifier drive equipment shall be designed for operation in an outdoor installation with exposure to the locally variable climatic conditions, including temperature and weather conditions. Each clarifier mechanism shall be capable of producing a withdrawn sludge concentration of 10,000 mg/l (TSS) or greater, with less than 2 feet of sludge stored in the clarifier.

1.6 DELIVERY, STORAGE AND HANDLING

- A. **General.** The delivery, storage, and handling of the clarifier equipment shall be in accordance with Section 01 60 00 "Materials and Equipment," and the manufacturer's instructions.
- B. **Fabricated assemblies** shall be shipped in the largest sections permitted by carrier regulations, properly matched-marked for ease of field erection.
- C. **All components** shall be erected immediately upon receipt from the clarifier manufacturer or stored in strict conformance with storage recommendations provided by the clarifier manufacturer in the operations and maintenance manual.
- D. **Each mechanism** shall be lubricated in strict accordance with the instructions of the clarifier manufacturer's field service representative. The required lubricants shall be provided by the Contractor.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN REQUIREMENTS

- A. **Design.** All parts of the mechanisms shall be of ample strength to withstand all stresses that may occur either during operation, fabrication, shipping, or erection.
- B. **Performance.** The equipment shall comply with the performance and design requirements specified in Paragraph 1.5 - "Job Conditions", and the schedule.
 - 1. **Steel.** All structural steel shall conform to Standard Specifications for structural steel for bridges and buildings, ASTM A36 and A992. All steel plates shall conform to ASTM A283C requirements. Any ductile iron used shall comply with ASTM A536 requirements. All plates and structural member for submerged service shall have a minimum thickness of 1/4 inch, unless otherwise stated.
- C. **Materials**
 - 1. **Steel.** All structural steel shall conform to the Standard Specifications for structural steel for bridges and buildings, ASTM A36.
 - 2. **Castings.** All castings shall conform to ASTM A48, Standard Specifications for gray iron castings and shall have a minimum tensile strength of 30,000 pounds per square inch (psi). All castings shall be free of warp, fins, gas and pit holes, and other defects that might impair strength or appearance.
 - 3. **Fastening.** All parts of the clarifier mechanism attached to the tank shall be fastened with stainless steel Type 316 anchor bolts, with necessary hex nuts and washers. All fasteners for the mechanism shall be ASTM A325 high strength.

4. Welding. All welding shall be in accordance with the standards of the American Welding Society.
5. Painting. See Section 09 90 00 "Painting."
6. Electrical. See Electrical Division.

2.2 MANUFACTURED EQUIPMENT

- A. **General.** Clarifiers 3 and 4 shall each be fitted with a new central driving mechanism which shall rotate a center cage with two scum skimmers, one rapid sludge removal header, and one counterbalancing truss.
- B. **Center Drive Mechanisms**
 1. General. Each drive mechanism shall be completely factory assembled and shall consist of a primary gear reduction unit, an intermediate reduction unit, plus a final reduction unit consisting of a pinion and internal gear enclosed in a turntable base. All gearing shall be enclosed in gray cast iron ASTM A-48, Class 30-A or ASTM A-36 steel housings. Exposed gearing will not be considered.
 2. Drive components shall be located via a machined, registered fit to preserve the alignment of key drive components under all load conditions. Inspection of the completed drive unit shall be accomplished at the clarifier manufacturer's shop, with reports of all tests and certifications of material hardness being made available for review at the Engineer's request prior to shipment to the job site.
 3. Major drive components, main gears and bearings shall be designed to allow for separate and individual replacement by plant personnel to facilitate quick and economical repairs.
 4. Each complete center drive assembly, including the overload protection device, shall be a regularly manufactured in-house product of the clarifier manufacturer. Drive assemblies purchased from third party vendors will not be accepted.
 5. Primary Reduction Units
 - a. The primary reduction unit shall be a heavy duty helical gear reducer.
 - b. All bearings shall be anti-friction type and running in oil in a cast iron housing. Bearing life shall have an AFBMA B-10 bearing life exceeding 200,000 hours. Lubrication fittings shall be readily accessible. An oil sight glass, fill pipe, and drain line shall be provided.
 - c. The primary reduction gear reducer shall drive the intermediate reduction unit through a chain and sprocket arrangement. The drive chain shall be No. 80L self-lubricated roller chain and be covered with a Type 304 stainless steel OSHA approved removable guard. Proper chain tension shall be provided for by an adjustable steel base mounted on the intermediate reduction unit. Sprockets and chain shall be designed for the connected horsepower of the drive with a minimum service factor of 4.0.

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- d. Proper chain tension shall be provided for by an adjustable steel base mounted on the intermediate reduction unit.
6. Intermediate Reduction Units
 - a. The intermediate reduction unit shall be heavy-duty, worm gear speed reducer in a gray cast iron housing, with grease and oil lubricated anti-friction type bearings. The unit shall be mounted on a machined face on the top of the final reduction unit and properly aligned to maintain accurate centers for the final reduction gearing.
 - b. The housing shall be constructed of ASTM A48 cast iron. The worm shall be constructed of AISI 4142 heat treated steel, and the worm gear of centrifugally cast Herculoy bronze. The housing shall be constructed of ASTM A48 cast iron or equal. The worm shall be constructed of AISI 4142 heat treated steel, from 8620 alloy steel, hardened and carbonized or of centrifugally cast high strength manganese bronze. The worm and worm gear shall be designed based upon AGMA 6034 for the specified torque.
 - c. A single-piece or two-piece pinion and shaft shall be keyed to the worm gear to transmit power from the worm gear to the spur gear.
 - d. In order to maintain proper alignment between the pinion and the spur gear, the pinion shall be supported by bearings both above and below the spur gear. The bearing shall be fitted into precision machined bearing pilots to positively insure bearing and gear alignment. Bearing life shall have an AFBMA -10 bearing life of at least 50,000 hours.
 7. Final Reduction Units
 - a. The final reduction unit shall be secured to the turntable base and shall consist of a main gear and a pinion mounted in a ASTM A48 Class 30A cast iron or ASTM A-36 steel housing with a removable steel cover plate and Neoprene dust seals. The base plate on which the gear/bearing is mounted shall have a minimum thickness of 1.50 inches. The surface on which the gear/bearing is mounted shall be machined flat within 0.008 inches. The steel plate to which the intermediate pinion drive gear box is mounted shall have a minimum thickness of 1.00 inches. The top of the final reduction housing may provide a center platform to allow adequate access to the drive unit and have clearances as shown on the plans.
 - b. The internal final gear shall be driven by a heat-treated steel pinion and shall be mounted on the output shaft of the intermediate reduction unit. The gear teeth shall be made of AGMA Grade 5 or higher. The gear material shall be ductile modular iron per ASTM A-536, through hardened to 200 to 260

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- or AISI 4150 steel. Brinell hardness as cast and shall be induction hardened to a hardness of 54-60 Rc. The main gear shall have a deep face height of 6 inches or larger as required by AGMA 2001 and the gear teeth shall be hardened to at least 278 BHN.
- c. Spur pinion shall be 4140 or 4340 heat treated alloy steel. Spur pinion shall be keyed to a heat-treated alloy steel shaft. No welding will be acceptable on the spur gear or its shaft.
 - d. The main gear shall rotate and be supported on a ball bearing assembly provided with four replaceable liner strips fitted into the main gear and turntable base. Liner strips shall be special vacuum degassed, carbon corrected, alloy steel hardened to a Rockwell hardness of at least 43 to 46 Rc. The strip liner design shall be such that the B-10 life of the liner is a minimum of 20 years based on the specified mechanism speed and a uniformly distributed load on the rotating mechanism. Alternatively, the main gear shall rotate and be supported on a ball bearing assembly provided with a four-point contact precision raceway with B-10 bearing life of at least 100 years.
 - e. Ball bearings shall be AFBMA Grade 500 or SAE 52100, 58 Rockwell Hardness, minimum diameter of 1 inch. Provide nylon spacers located between ball bearings, where applicable.
 - f. The turntable base shall be bolted to the center column and the turntable base and internal gear shall be designed to support rotating mechanism, access bridge, and center cage. Each turntable base shall be designed with a full side wall, to provide a secure oil bath compartment.
 - g. The main gear and pinion shall be lubricated by means of an oil bath and the meshing action of the pinion and internal gear shall force lubricant up the face of the teeth. The internal gear, pinion, and ball race shall run in an oil bath and be protected by a felt seal and steel dust shield. Lubrication fittings shall be readily accessible. An oil sight glass, fill pipe, and valved drain line shall be provided. Provide a minimum of 2-inch-deep oil reservoir below the bottom of the bearing. The drive unit housing shall be designed with a separate condensate collection compartment of a minimum 3-inch depth. The condensate collection compartment shall encircle the drive base, shall be located away from all bearings, and shall be located at the lowest points in the drive base. Provide valved condensate drain connection.
 - h. The drive mechanism shall be designed in accordance with AGMA Sections 2001-C95 (January 1995), "Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth"; and 6034-B92 (February 1992), "Practice for Enclosed Cylindrical Worm Gear Speed Reducers and Gearmotors"; for 24-hour continuous duty, and 20-year design gear life, based on the AGMA rated torque. Main gear set service factor shall be a minimum of 1.25 based on continuous

running torque. The momentary peak strength (bending strength) of the Final Reduction Unit shall be a minimum of 200 percent of specified continuous design running torque. All bearings shall be designed for a minimum B-10 life of 200,000 hours.

- i. All bolts, nuts, washers, etc. for the final reduction unit shall be Type 316 stainless steel.
- j. The AGMA rated torque of the drive shall be the lowest value computed for worm gear, spur gear, and pinion for strength and durability.

C. Torque Protection

- 1. To provide adequate protection, all parts of the collecting mechanism shall be designed to withstand a momentary peak torque of 1.65 times the cut-out torque without permanent deformation.
- 2. To protect against failure of the center drive mechanism, all parts of the drive mechanism shall be designed to withstand a momentary peak load of 2.00 times the cut-out torque.
- 3. The drive units shall be protected by a shear pin device set for 130 percent of the rated continuous running design torque.
- 4. Torque Overload Alarm. The electro-mechanical overload alarm shall be mounted to the drive unit at the thrust end of the worm shaft and shall consist of a disc spring or compression spring assembly, gear rack and pinion, a torque indicator dial visible through a Plexiglas window, two micro switches, and a terminal block all enclosed in a weatherproof NEMA 4X cast aluminum or cast iron housing.
 - a. The indicator dial shall be 0 to 130 percent of continuous running design torque.
 - b. The thrust of the worm shaft against the disc springs shall actuate the gear rack and pinion, micro switches, and indicator dial in direct proportion to the operating torque.
 - c. A 120 volt space heater shall be provided in the weatherproof housing for condensate control.
 - d. The torque overload alarm device shall be micro switches set at the following capacities and designed to interface with the motor control center starter compartment circuit:
 - 1) One torque switch to indicate an alarm when the load on the mechanism reaches 85-percent of the continuous running design torque capacity of the drive, and indicate an alarm.
 - 2) One torque switch to stop the motor when the load reaches 100-percent of the continuous running design torque capacity, and indicate alarm.
 - 3) One torque switch to Stop the motor when a shear condition is reached, and indicate an alarm.

D. **Drive Assemblies**

1. The motor shall be rated at 1,800 rpm, squirrel cage, induction type, totally enclosed, fan cooled, ball bearing, continuous duty, 104 degrees F (40 degrees C) ambient, 1.15 service factor, Class F insulations, of ample power for starting continuously operating the unit without overloading. The motor shall conform to NEMA standards and be name plated for operation on 460 volt, 3 phase, 60 hertz current.
2. A motor high temperature switch shall be provided in stator winding and bring lead up to terminal block.

E. **Anchor Bolts.** All equipment anchor bolts shall be Type 316 stainless steel, furnished by Equipment Manufacturer, and of ample size and strength for the purpose intended. All anchor bolts shall be set by the Contractor in accordance with the manufacturer's instructions.

F. **Manufacturer Provided Controls.** Provide torque switches as specified in herein.

G. **Manual Control.** Plant staff will manually turn mechanism on and off at the motor control center.

H. **SCADA System Monitoring.** Torque overload alarm and shut down will be monitored and alarmed.

2.3 **ACCESSORIES**

A. **Provide 120 volt space heater** as specified herein.

2.4 **SPARE PARTS**

A. **Provide the following Clarifiers 3 and 4 spare parts** to the Owner, boxed, marked, and ready for long term storage.

1. One set of oil sight glasses or dip stick.
2. One oil change supply for summer viscosity (two clarifiers).
3. One oil change supply for winter viscosity (two clarifiers).

B. **Provide any parts** that are defective or wear out within the first two years of equipment operations; the time period beginning at the acceptance of this equipment.

C. **Special Tools**

1. Deliver to Owner in same manner as extra materials.
2. Include tools that are required to assemble, disassemble, repair and maintain equipment, and that have been specifically made for use on equipment.

3. Include necessary hooks and rods for handling equipment parts that are not permanently attached with each tool set.
4. Special tools shall be marked or tagged as to the purpose.
5. Include list of tools with the maintenance and operation data describing the uses of tools.
6. Neatly mount each set of tools, eyebolts, hooks, and rods in box with hinged cover, suitable for wall mounting.

2.5 **FINISHES**

- A. **Shop Primed.** Shop priming of non-wetted parts shall be as specified in Section 09 90 00 "Painting." All non-submerged steel shall be sandblasted to SSPC-SP-6 specifications and given one coat of manufacturer's epoxy primer 2-3 MDFT.
- B. **Drive Shop Finishing**
 1. Manufactured mechanical components shall be shop finished as specified in Section 09 90 00 "Painting." The manufacturer's standard paint system will be accepted only if found to be suitable for the service of the equipment installation by the Engineer/Architect.
 2. Prior to assembly of the drive unit, the castings shall have been sandblasted and thoroughly cleaned to remove any foreign particles in the drive base. After assembly, the drive mechanism shall be solvent cleaned and power wire brushed as needed prior to application of manufacturer's standard primer.
 3. Gear motors shall be furnished with manufacturer's standard enamel.
- C. **Field Painting.** The mechanism shall be field finish painted as specified in Section 09 90 00 "Painting." Field coating products shall be compatible with shop finished coats previously applied. Obtain equipment manufacturer's permission to apply contractor supplied paints or coatings. Submit evidence of manufacturer's permission to the Engineer/Architect's for approval.

2.6 **SOURCE QUALITY CONTROL**

- A. **Center Drive Testing.** Each complete drive shall be assembled in the clarifier manufacturer's shop and tested to assure the drive is running properly and to calibrate the drive control. A complete test report shall be sent to the Engineer/Architect verifying that the drive meets the quality assurance of the manufacturer and Engineer/Architect.

2.7 **FABRICATION**

- A. **Factory Assembly and Marking**
 1. Assembly equipment subassemblies to ensure proper fitting of parts.
 2. Match mark units with erection marks. Dismantled units for shipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. **Site Verifications of Conditions.** Verify that surfaces and site conditions are ready to receive work and the following conditions:
 - 1. Verify access platform dimensions.
 - 2. Electrical conduit and control conduits are properly sized and located.
- B. **Responsibility.** Beginning the installation means the installer accepts the existing surfaces and conditions.

3.2 PREPARATION

- A. **Protection.** Protect adjacent equipment, piping, and valving against damage from the drive installation where required.
- B. **Manufacturer's Instructions.** Preparatory work in accordance with manufacturer's instructions shall be completed prior to equipment installation.

3.3 INSTALLATION

- A. **Requirements.** Fabrication and installation of the clarifiers' drives shall be as shown on the drawings, as specified herein, in accordance with the approved shop drawings and the manufacturer's instructions and recommendations. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendation.
- B. **Interface with Other Items.** Complete all electrical power and control connection under Division 16, Electrical.

3.4 FIELD QUALITY CONTROL

- A. **Inspection.** It is the Contractor's responsibility to notify and coordinate with the equipment manufacturer in a timely manner in order for them to conduct their required inspection, servicing, operation testing, and instruction as required in this specification section.
- B. **Site Tests**
 - 1. Methods. Field tests shall be in accordance with Section 01 79 00.
 - 2. Torque Test.
 - a. The purpose of the test shall be to verify the structural integrity of the mechanism and drive, and to verify that the torque protection system and electronics operate as required, and as

- specified. The equipment manufacturer shall provide a qualified service person to supervise tests.
- b. The clarifier mechanism shall be field torque tested. The testing shall be carried out under the supervision of the equipment manufacturer before the mechanisms are approved and placed into operation.
 - c. The torque test shall consist of securing the rake arms by cables to anchor bolts installed by the Contractor in the tank floor at locations recommended by the manufacturer and the Engineer. A torque load shall be applied to the scraper arm by means of a ratchet lever and cylinder connected to the cable assembly.
 - d. The magnitude of the applied load shall be measured by calculating the torque from the distance of the line of action of each cable to the center line of the mechanism. Readings shall be taken at 40-percent, 85-percent, and 100-percent of design torque value. The test load shall be applied and noted on the torque overload device.
 - e. The manufacturer's serviceperson shall certify that the alarm and motor cut-out torque of the drives as calibrated in the manufacturer's shop are in proper operation to shut down the units as specified.
 - f. This field test shall include checking the operation of warning and drive shut down circuitry.
 - g. All equipment required for the test shall be provided by the manufacturer. After the successful test, the testing equipment shall be returned to the equipment manufacturer.
3. Wet Test. The equipment shall be field tested with actual process flow containing design flow and activated sludge concentrations. The drive shall be demonstrated to collect, transport, and thicken sludge as specified.
- C. **Manufacturer's Representative.** A qualified representative of the equipment manufacturer shall inspect the completed installation, service the equipment, and operate the equipment under all design conditions, instruct the Owner's personnel in proper operating and maintenance procedures, and provide the Owner with a written certificate of approval in accordance with Section 01 33 00 "Submittals." The representative shall spend 16 hours (total for both clarifiers) performing required on-site services and submit a manufacturer's representative report as specified in Section 01 79 00 "Start-Up, Demonstration, and Testing."
- D. **Defective Work.** If defects are detected, it will be the responsibility of the Contractor to take corrective procedures.

3.5 ADJUSTING

- A. **Test Results.** If the results of the torque test and wet test do not show successful

operation and sludge and scum removal, the Contractor shall repair, adjust, or modify the equipment according to the manufacturer's instructions at no cost to the Owner until these tests are successfully completed.

3.6 **CLEANING AND DISPOSAL**

- A. **Cleaning.** Cleaning shall be in accordance with Section 01 74 23, "Cleaning."
- B. **Disposal.** The Contractor is responsible for the removal from the job site, and as necessary, safe disposal of all excess materials, and debris as result of the work completed under this section, including testing procedures. Disposal shall be in accordance with Section 01 74 23, "Cleaning."

3.7 **PROTECTION**

- A. **Requirements.** The Contractor shall be responsible for provisions to protect the drive equipment and associated equipment and materials after installation but prior to acceptance by the Owner. Protection of the equipment shall include provisions during installation and testing of nearby piping, valving, and other adjacent equipment. The Contractor shall remove all protective measures installed at completion and acceptance of the project.

3.8 **INSTRUCTION OF OPERATING PERSONNEL**

- A. **Training.** Training shall be conducted in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," and shall include all equipment specified in this section and all related electrical and instrumentation equipment. Training for the two drives covered in this specification will be conducted concurrent with the training for Clarifiers 1 and 2, and shall be conducted over one 8-hour day onsite.

3.9 SECONDARY CLARIFIERS 3 AND 4 EQUIPMENT SCHEDULE

| | |
|---|------------------|
| Number | 2 |
| | |
| Diameter | 80 feet 0 inches |
| Sidewater Depth | 14 feet 0 inches |
| | |
| Shear Pin Torque (130% AGMA Rating) | 28,470 ft-lb |
| Peak Motor Shut-Off Torque | 26,280 ft-lb |
| Alarm Torque (100 % AGMA Rating) | 21,900 ft-lb |
| Minimum AGMA Design Running Torque | 21,900 ft-lb |
| Minimum AGMA Continuous Running Torque | 15,000 ft-lb |
| | |
| Minimum AFBMA B-10 Bearing Life | 200,000 hrs |
| | |
| Minimum Internal Gear Pitch Diameter | 30 inches |
| Minimum Ball Race Diameter | 42 inches |
| Minimum Gear Tooth Height in Final Reduction Unit | 4 inches |
| | |
| Minimum Motor Horsepower | 0.5 hp |

END OF SECTION

SECTION 44 52 50

BLOWERS BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions; Division 1; and all other related specification sections, apply to this section.
- B. **Electric motors shall be furnished** as part of the work of this section and shall conform to all applicable portions of Division 26.
- C. **Instrumentation and control work**, except as specified herein, is included in Division 40. Instrumentation and controls provided in this section shall adhere to Instrumentation and Control Specifications Sections in Division 40.

D. DESCRIPTION OF WORK

- E. **Scope of Work.** The Contractor shall provide all labor, tools, equipment, and materials necessary to furnish and install the turbo and positive displacement blowers in accordance with the drawings and as specified herein.

1.2 QUALITY ASSURANCE

- A. **Codes and Regulatory Agencies.** Perform all work in compliance with all federal, state, and local codes and regulatory agencies.
- B. **Standards.** Materials and workmanship shall be in accordance with the following standards as referenced herein:
 - 1. AFBMA - Antifriction Bearing Manufacturers' Association.
 - 2. ANSI - American National Standards Institute.
 - 3. ASME - American Society of Mechanical Engineers.
 - 4. ASTM - American Society for Testing and Materials.
 - 5. AWS - American Welding Society.
 - 6. IEEE - Institute of Electrical and Electronics Engineers.
 - 7. NEMA - National Electrical Manufacturers Association.

1.3 SUBMITTALS

- A. **General.** Submit the specified submittal package in accordance with Section 01 33 00, "Submittals," and the specific blower specification sections included later in the contract documents.

1.4 JOB CONDITIONS

- A. **Coordination.** Coordinate all work to prevent delays, errors, and/or omissions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. **Delivery.** All units shall be shipped assembled as much as practical. All units shall be labeled with all labeling intact and legible with item name, model number, size, and manufacturer's name.
- B. **Storage.** All units, accessories, and components shall be stored in the manufacturer's original package, under cover and protected from damage. Maintain a grease coating on all bearings and shafts to prevent rusting. All filter material shall be kept dry and dust free. Blower shafts shall be turned at intervals as recommended by the blower manufacturer.
- C. **Handling.** Handle all units and components in accordance with the manufacturer's instructions. Use lifting rings and canvas harnesses for lifting to prevent damage, scratching, or abrading finished surfaces.

1.6 SPECIAL WARRANTY

Not used.

PART 2 - PRODUCTS

2.1 MATERIALS

A. **Blower**

- 1. General. Blower shall be heavy duty, suitable for continuous, efficient, and dependable service under operating conditions imposed by the installation and specific blower specification.
- 2. Castings. All castings shall be free of warp, fins, gas and pit holes, and other defects that might impair strength or appearance. Cast iron castings shall have a minimum tensile strength of 30,000 pounds per square inch (psi) and conform to the applicable ASTM standard.
- 3. Steel. All steel shall conform to the applicable ASTM standard. All welding shall be in accordance with the standards of the AWS.
- 4. Shop Test. Unless otherwise noted, certified performance data based on tests of each blower furnished shall be submitted to the Engineer/Architect for acceptance. Tests shall be performed for not less than 1 hour and in accordance with ASME Power Test Code and shall demonstrate compliance with the operating conditions specified. When specified, the Engineer/Architect shall be notified and afforded the opportunity to witness the test.
- 5. Nameplate. An aluminum or stainless steel nameplate shall be attached to each blower in a clearly visible, easily accessible location. Nameplate shall be stamped with the following for each blower.
 - a. Manufacturer's name.
 - b. Model number.
 - c. Serial number.
 - d. Design capacity, standard cubic feet per minute (scfm).

- e. Design pressure, psi.
- f. Design speed, revolutions per minute (rpm).

B. Motor

1. Motor shall be rated for continuous duty and shall be inverter rated with impulse peak resistance. Motors shall have NEMA Class F insulation. When a blower motor is connected to variable frequency drive (VFD), the motor shall be compatible with the variable frequency drive, and the motor manufacturer shall be required to issue a letter of compatibility stating that the VFD and motor are compatible.
2. Motor enclosure shall be as listed in the applicable equipment schedule. Motor enclosure notations are:
 - a. E-P (EXP) - Explosionproof.
 - b. TENV - Totally enclosed nonventilated.
 - c. TEFC - Totally enclosed, fan-cooled.
 - d. ODP - Open dripproof.
3. Temperature rise shall be in accordance with NEMA limits for the class of insulation, service factor, and enclosure specified.
4. Thermal motor protection shall be by positive temperature coefficient (PTC) thermistors wired in series.
5. Motor performance shall conform to the requirements of NEMA MG1 Part 12 and shall be expressed as indicated in NEMA MG1-12.30 and a report of test for routine tests shall be submitted based on IEEE test procedure 112, Method B.
6. Motor terminals shall be provided and marked as required for the application described in NEMA MG1 Section 2 and as required in Division 26.
7. Motor shall have a 1.15 service factor rating. The blower brake horsepower (bhp) requirements shall not exceed the motor nameplate horsepower under the operating conditions as listed in the applicable Equipment Schedule.
8. Motor shall be designed to operate at the highest efficiency and power factor.
9. Motor shall be of standard manufacturer, General Electric, U.S. Motors, Reliance Electric, or equal.
10. Shop Test. Tests shall be performed in accordance with ANSI/IEEE Standard 112 and ANSI C52.1, parts 12 and 20 (NEMA MG1). When specified, the Engineer/Architect shall be notified and afforded the opportunity to witness the test.
 - a. Routine Test. A certified report of a routine test of each motor furnished shall be submitted to the Engineer/Architect for acceptance. Tests shall include running light current, power input, and high potential.
 - b. Certified Data. Unless otherwise specified, certified data shall be furnished for motor efficiency and power factor at 100 percent, 75 percent, and 50 percent of full load based on test data of a motor of identical design.

- c. Full Test. When specified, a certified report of a full motor test of each motor furnished shall be submitted to the Engineer/Architect for acceptance. Tests shall include full load heat run, percent slip, running light current, locked rotor current, starting torque, efficiencies and power factor at 100 percent, 75 percent, 50 percent full load, and winding resistance and high potential tests.
11. Motor Nameplate. An aluminum or stainless steel nameplate shall be attached to each motor clearly visible showing operational data in accordance with NEMA MG-1.
- C. **Accessories.** The following accessories shall be supplied for every blower in this project covered by the specifications unless indicated otherwise in the detailed specification or drawing for that specific blower.
- 1. Check Valve. Check valve shall be provided for the discharge piping on each blower. The valves shall be the size and joint shown. The valves shall have a cast iron body with bronze and stainless steel trim and shall be suitable for 25 pounds per square inch (psi) working pressure and 250 degrees F (121 degrees C) continuous operating temperature.
 - 2. Butterfly Valve. Butterfly valve shall be provided for the inlet and discharge piping on each blower. The valves shall be the size and joint shown. The valves shall have a cast iron body with bronze and stainless steel trim and shall be suitable for 25 psi working pressure and 250 degrees F (121 degrees C). continuous operating temperature. The stem shall be bushed and sealed. Valve sizes through 8 inches shall be equipped with a lever operator and locking device. Valves over 8 inches shall be equipped with an enclosed traveling nut operator, handwheel, and indicator.
 - 3. Expansion Joint. Expansion joint shall be provided for the inlet and discharge piping on each blower. The expansion joints shall be reinforced synthetic rubber compatible with the size and type of piping shown. They shall be suitable for 15 psi working pressure and 250 degrees F (121 degrees C) operating temperature. The expansion joints shall be tied with resilient mounted steel rods or otherwise restrained from over extension due to internal pressures.
 - 4. Thermometers. The blower package will include a discharge temperature gauge mounted on the noise enclosure. The discharge temperature gauge shall be supplied by the blower manufacturer and shall be Weiss Model 25UB3-5131 with 2.5 inch dial, or approved equal.
 - 5. Gauges. The blower package shall include pressure/vacuum gauges on either the suction or discharge of the blower. Gauges shall be mounted on the noise enclosure. Gauges shall be supplied by the blower manufacturer and shall be Ashcroft Model 1009SW with 2.5 inch dial, or approved equal.

2.2 **FINISHES**

- A. **Exterior Surfaces.** All surfaces exposed shall be shop primed and field finished in accordance with Section 09 90 00 "Painting," as per "Interior Nonsubmerged Ferrous Metals and Equipment" requirements. All surfaces not exposed after installation shall be shop finished or shop primed and field finished prior to installation.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. **Site Verification of Conditions.** Prior to installation of equipment, verify that:
1. All clearances have been met.
 2. Bases, anchors, supports, and openings are located correctly and are of the proper size and material.
- B. **Variations.** Any variations of the requirements shown on the drawings or required by the manufacturer shall be corrected at no additional cost to the Owner. All methods of correction shall be submitted in writing and acceptable to the Owner and/or Engineer/Architect.

3.2 **PREPARATION**

- A. **Protection.** All surface areas shall be protected from damage. All finished floors shall be protected with a waterproof, oil resistant cover to prevent staining from oil and grease.

3.3 **INSTALLATION**

- A. **General.** The blower and components shall be installed in accordance with the manufacturer's instruction and the conforming shop drawings, including all gasket seals, isolation dampeners, cleanouts, drains, gauges, motors, controls, and power wiring.
- B. **Manufacturer's Field Service.** A qualified representative of each equipment manufacturer shall inspect the completed installation, service the equipment, operate the equipment under all design conditions, instruct the Owner's personnel in proper operating and maintenance procedures, and provide the Owner with a written certificate of approval.
- C. **Set anchor bolts** in accordance with the approved manufacturer's conforming submittals.
- D. **Lubrication.** Contractor shall furnish and apply an initial supply of grease and oil as recommended by the manufacturer and shall grease and oil the equipment throughout all testing until completion.

E. **Interface with Other Products**

1. Complete all electrical power and control connections.
2. Install and connect all piping, valves, and gauges.

F. **Inspection**

1. The Contractor shall inspect all parts of the blower for proper installation and conformance to the drawings and manufacturer's recommendations.

3.4 **REPAIRS/RESTORATION**

- A. **Damages.** Any chips, dents, scratches, stains, or other disfiguring of surrounding floors, walls, and/or accessories shall be repaired or replaced to the satisfaction of the Owner and/or Engineer/Architect at no additional cost to the Owner.

3.5 **CLEANING**

- A. **Surface.** The blower, motor, accessories, and surrounding areas shall be cleaned of all foreign material, grease, and oil stains.
- B. **Airway.** Remove all rags, sticks, debris, and construction materials. Damage to equipment components shall be replaced in like kind at no additional cost to the Owner.
- C. **Protection.** After cleaning, provide protective covering for each piece of equipment from damage.

3.6 **FIELD QUALITY CONTROL**

D. **Manufacturer's Field Service**

1. Perform field inspection of all components prior to placing in operation and submit manufacturer's installation inspection report addressing the following:
 - a. List of deficiencies found.
 - b. Recommended corrective action for all deficiencies.
 - c. Certification by manufacturer's representative that items are properly installed, aligned, and adjusted.

3.7 **DEMONSTRATION**

- E. **Visual.** The Contractor, Owner, and/or Engineer/Architect shall inspect the equipment for visual deficiencies.
- F. **Tests.** Dry and wet tests shall be performed and the equipment adjusted as specified in Section 01 79 00 "Start-up, Demonstration, and Training." During each motor start-up, at a minimum, the Contractor shall:

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1. Monitor the incoming power for over- or under-voltage or phase imbalance.
 2. Measure the DC bus voltage at the VFD.
 3. Measure the output voltage at the VFD and the input voltage at the motor. Determine voltage drop between drives and motors.
 4. Identify any phase imbalance.
 5. Measure output current at the VFD and identify any current imbalance.
 6. Provide a report of all tests performed and results to the Owner. Identify any deficiencies found.
- G. **Noise Tests.** The Contractor, in the presence of the manufacturer's representative and the Engineer/Architect, shall measure the sound level. The Contractor shall show that the decibel meter used is calibrated. Sound level shall be measured for one unit operating at a time and measured 3 feet from the unit in all directions. The Contractor shall submit a field test report as specified in Section 01 79 00 "Start-up, Demonstration, and Training."
- H. **Operational Demonstration.** An operational demonstration shall be performed as specified in Section 01 79 00 "Start-up, Demonstration, and Training." Verify and note in the operational demonstration log that all design conditions for blower capacities and pressures, and motor nameplate data have been equaled or exceeded for the demonstration period.

3.8 EXTRA MATERIAL

- I. **Spare Parts.** The spare parts called for in the various blower specifications shall be protected and packaged as recommended by the manufacturer. Each package shall be tagged for positive identification noting:
1. Part name.
 2. Part number.
 3. Associated equipment name and number.
 4. Manufacturer's name and address.

END OF SECTION

SECTION 44 52 54

SLUDGE HOLDING POSITIVE DISPLACEMENT BLOWER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1, Section 44 52 50 "Blowers Basic Requirements," and all other related specification sections, apply to this section.
- B. **Electrical provisions** shall be provided within Division 26.

1.2 DESCRIPTION OF WORK

- A. **Scope of Work.** The Contractor shall provide all labor, tools, equipment, and materials necessary to furnish and install Sludge Holding Blower No. 3 in accordance with the drawings and as specified herein.

1.3 QUALITY ASSURANCE

- A. **General.** In accordance with Section 44 52 50 "Blowers Basic Requirements."
- B. **Source.** All positive displacement blowers shall be of the same manufacturer. All drives shall be of one manufacturer.

1.4 SUBMITTALS

A. **General**

- 1. All submittals shall be submitted in accordance with the Division 1 Submittal Requirements and the requirements within this specification section.

B. **Submittal Package 1 – Product Data and Shop Drawings**

- 1. **Product Data.** Furnish manufacturer's product data including blower curves, accessories, options, dimensions, weights, and list of special tools in accordance with Section 01 33 00 "Submittals."
- 2. **Performance Data.** Submit performance data and curves for preliminary review of the blower equipment to be furnished. Such data shall be based on actual tests of similar equipment and include sufficient data to demonstrate suitability blower and driver for the conditions specified.
- 3. **Shop Drawings.** Shop drawings shall be submitted showing materials, accessories, coatings, dimensional layouts, anchor bolts, sectional views of blower construction, driver specifications, wiring diagrams, and a bill of materials.

C. **Submittal Package 2 – Operation and Maintenance Manuals and Personnel Qualifications**

1. Operation and Maintenance (O&M) Manuals. Submit O&M manuals in accordance with Sections 01 33 00 "Submittals" and 01 79 00 "Start-up, Demonstration, and Training." The initial review copy of the O&M manual and revised copies shall be submitted to the Engineer/Architect prior to delivery of the equipment.
2. Personnel Qualifications. Submit qualification statements of all manufacturers' representative personnel that will be servicing the equipment shall be submitted with the revised copies of the O&M manuals.

D. **Submittal Package 3 – Shop Tests**

1. Test Report. A test report, in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," shall be submitted within 48 hours of completion, suspension, or termination of testing the blowers under all design conditions.
2. Noise Performance and Tests. Each blower package with sound enclosure shall be factory tested and shall produce a sound pressure level as specified in the Equipment Schedule. Exact test procedure proposed shall be submitted to the Engineer/Architect prior to testing. Test results shall be certified and submitted to the Engineer/Architect and the Engineer/Architect shall be given opportunity to witness the tests. Any blower system not passing this test will not be accepted and shall not be shipped. Individual blower system noise production data at maximum pressure and various speeds shall be submitted with the shop drawings. Such data shall be based on actual tests of similar equipment.

E. **Submittal Package 4 – Field Tests**

1. Manufacturer's Representative Reports. Manufacturer's representative reports, in accordance with Section 01 79 00 "Start-up, Demonstration, and Training," shall be submitted within 48 hours of each site visit. Product and material certifications and inspection data as specified in Section 01 33 00 "Submittals" shall be included with the report.

1.5 **JOB CONDITIONS**

- A. **General.** See Section 44 52 50 "Blowers Basic Requirements."

1.6 **DELIVERY, STORAGE, AND HANDLING**

- A. **General.** See Section 44 52 50 "Blowers Basic Requirements."

1.7 **SPECIAL WARRANTY**

- A. One-year warranty period for the new sludge blower and three replacement motors to begin after staggered 30 day demonstration period is complete.

PART 2 - PRODUCTS

2.1 BLOWER

- A. **Type.** Blower shall be rotary, positive displacement, two or three impeller type, operating without internal sealing fluid or rubbing parts. The blower systems shall be packaged mounted, factory engineered, pre-assembled units.
- B. **General.** Blower shall be in accordance with Section 44 52 50 "Blowers Basic Requirements."
- C. **Package System Frame.** The framing system shall be ruggedly built, capable of supporting the operating machine without visually discernible vibration. The base plate shall be a minimum of 3/8 inch thick steel. Two full-side mounting plates shall be provided. All welds shall be continuous.
- D. **Casings.** The blower casings shall be of cast iron, one-piece construction. The case shall be suitably ribbed to prevent distortion under the operating conditions. End or head covers shall be removable for easy access for bearing and gear inspection. The inlet and discharge connections shall be internal NPT threads or flanges drilled and tapped to Class 125 ANSI B16.1 specifications. Oil baths shall be fitted with fill, drain, vent, and level gauge appurtenances. Provide pipe extensions on fill and drain connections for easy access.
- E. **Impeller.** The impellers shall be cast or ductile iron integral with or permanently fastened to the shaft. Impellers shall be straight, two or three lobe type designed to operate without contact. The rotors shall be machined, ground, and dynamically balanced to prevent excessive vibration.
- F. **Timing Gears.** The timing gears shall be manufactured of heat treated alloy steel. The timing gears shall be splash oil lubricated from internal oil reservoirs. The timing shall be field adjustable.
- G. **Seals.** Seals shall be located at each bearing. The seals shall be replaceable without disturbing the blower mounting or piping. Seal design shall prevent lubricant from contaminating the air stream. Seal design shall be a double sealing arrangement and include a labyrinth type inner seal.
- H. **Bearings.** The bearings shall be antifriction type and designed for a minimum AFBMA B-10 bearing life of 52,000 hours. A cylindrical roller bearing shall be provided at the drive shaft designed to handle all radial and thrust loads while single-row ball bearings shall be used at other locations. The drive end bearings shall be oil-splash lubricated. The gear end bearings shall be lubricated by splash from the gears dipping into the oil.
- I. **Shaft.** Shaft shall be constructed of forged alloy steel.
- J. **Base.** Bases shall have combination type discharge silencer and have a plain pipe stub connection. The blower mounting flange shall have rectangular opening, with maximum area for minimizing pressure drop. The base/discharge silencer shall be manufactured using carbon steel. The base/discharge silencer will have connections for a pressure relief valve, pressure gauge, discharge

temperature gauge, mechanical unloading valve and 1/2 inch drain built into the silencer. Packed/absorptive type silencers are not acceptable. The base/discharge silencer will be supplied by the blower manufacturer.

- K. **Enclosure.** Blower package components shall be housed in frame-mounted metal enclosures with zinc-plated or powder coated finish that is designed for sound attenuation with 2 inch minimum of acoustical foam insulation and continuous lip seals. Hinges, components supports, and Type 304 stainless steel fasteners shall be provided. Enclosure shall be factory finish painted with the standard factory color.
- L. **Accessories**
1. V-Belts and Guards. Blowers and drives shall be connected with multiple V-belts and sheave arrangement, complete with OSHA type guard. Additional sheaves shall be supplied for each blower for a speed of 80 percent of the design capacity speed. The guard shall be of sturdy welded steel construction without sharp edges or projections. Guards for outdoor service shall provide weather protection for the belt drive.
 2. Relief Valve. Each blower unit shall be supplied with a weight or spring-type relief valve for installation in the discharge line. The relief valve shall have sufficient capacity to prevent overloading the blower and motor when operating at design capacity with the discharge valve in the blower discharge line closed. If weight type, the valve shall include sufficient weights for a setting of 0.5 to 1 psi above the design differential pressure.
 3. Silencers. Each blower shall be equipped with a discharge silencer. The silencer shall be sized to handle 120 percent of the design capacity specified in the Equipment Schedule. The discharge silencer shall be incorporated into the base as described in Item J hereinabove. Silencer connections and support legs or hangers shall be sized to match blower and piping arrangement as shown. Provide suitable anchor bolts.
 4. Filter/Silencer. Each blower shall be provided with a flanged dry type inlet filter/silencer sized for 120 percent of the design capacity. The sizing and design of the filter shall be suitable for fully exposed outdoor service. Filter element shall be cleanable and replaceable. The filter shall be equipped with a filter restriction indicator suitable for up to 20 inches of water vacuum.
 5. Vibration mounts shall be supplied and capable of leveling the blower package to insure proper oil level to increase service and longevity of the equipment. Vibration mounts to be supplied by the blower manufacture and shall insure proper selection for the specific blower system supplied.
 6. High-Temperature Shutdown Switch. Each blower shall be equipped with a single set point, factory installed high temperature safety switch in a NEMA 4X enclosure with contact closure output to shut the motor off in the event an unsafe blower temperature is reached. The switch shall operate on the vapor pressure principle and shall be Ashcroft P-series, or equal.

2.2 DRIVES

- A. **Type.** Motors shall be squirrel cage induction type and of the size and configuration listed in the Equipment Schedule and as specified in Section 44 52 50 "Blowers Basic Requirements."
- B. **Connections.** Motors shall be belt drive with lead connections necessary to properly function with the type of full voltage or reduced voltage starters indicated on the one-line power diagram of the electrical drawings.
- C. **Starting.** The starter shall be full-voltage, non-reversing NEMA size-2 and located within the tertiary treatment electrical room motor control center.
- D. **Bearings.** Separate grease tubes to both the fill and drain plugs for both the front and rear motor bearings shall be installed such that bearing grease replacement can be completed by maintenance staff outside of the blower enclosure.

2.3 MANUFACTURERS

- A. **Positive displacement blower** manufacturer shall be base bid, as per Kaeser Compressors of Fredericksburg VA.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. **In accordance** with Section 44 52 50 "Blowers Basic Requirements."

3.2 FIELD QUALITY CONTROL

- A. **In accordance** with Section 44 52 50 "Blowers Basic Requirements."

3.3 DEMONSTRATION

- A. **In accordance** with Section 44 52 50 "Blowers Basic Requirements."

3.4 EXTRA MATERIALS

- A. **Spare Parts.** In accordance with Section 44 52 50 "Blowers Basic Requirements."
 - 1. Seals. Provide one spare set of seals.
 - 2. Belts. Provide one spare set of belts.
 - 3. Sheaves. Provide one extra sets of sheaves for 80 percent of the design capacity speed.
 - 4. Filters. Provide one spare set of filters.

PART 4 - SCHEDULE

4.1 GENERAL REQUIREMENTS

- A. **Compressed Fluid** Air

B. Inlet Conditions of Air

- | | | |
|----|----------------------|----------------|
| 1. | Temperature | 110 degrees F. |
| 2. | Atmospheric Pressure | 14.3 psi |
| 3. | Relative Humidity | 60 percent |

C. Standard Conditions of Air

- | | | |
|----|-------------------------|---------------|
| 1. | Summer. | |
| | a. Temperature | 68 degrees F. |
| | b. Atmospheric Pressure | 14.7 psi |
| | c. Relative Humidity | 36 percent |
| | d. Specific Weight | 0.075 pcf |
| 2. | Winter. | |
| | a. Temperature | 0 degrees F. |
| | b. Atmospheric Pressure | 14.7 psi |
| | c. Relative Humidity | 35 percent |
| | d. Specific Weight | 0.075 pcf |

4.2 DESIGN REQUIREMENTS

- A. **Design Speed and Pressure.** The design speed and pressure shall not exceed 85 percent of the published maximum design speed or pressure of the blower.

4.3 SLUDGE HOLDING BLOWER

A. Number

- | | | |
|----|---------------------------|---|
| 1. | Blower Package Complete | 1 |
| 2. | Blower Replacement Motors | 3 |

B. Operating Conditions

- | | | |
|----|--------------------------------|-----------|
| 1. | Design Capacity | 910 scfm |
| 2. | Design Differential Pressure | 11.7 psi |
| 3. | Maximum Gear Tip Speed | 4,200 fpm |
| 4. | Maximum Static Back Pressure | 10.8 psi |
| 5. | Intake Losses | |
| | a. Filter | 0.20 psi |
| | b. Silencer | 0.30 psi |
| 6. | Discharge Losses | |
| | a. Silencer | 0.30 psi |
| | b. Piping | 0.10 psi |
| 7. | Maximum Noise Level at 1 Meter | 78 dBA |

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B. Motor Requirements

| | | |
|----|------------|-------------------|
| 1. | Speed | 1,800 rpm |
| 2. | Horsepower | 100 hp |
| 3. | Voltage | 460 volts |
| 4. | Phase | 3 phase |
| 5. | Hertz | 60 Hz |
| 6. | Enclosure | Sound-attenuating |
| 7. | Test | Routine |
| 8. | Rating | Inverter Duty |

END OF SECTION



BOARD OF COUNTY COMMISSIONERS

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ADVERTISEMENT FOR BIDS

Sealed bids will be received by the Clerk of the County Commissioners, Warren County, Ohio, 406 Justice Drive, Lebanon, Ohio 45036, until 11:00 AM, Thursday May 14, 2020, at the Office of the Warren County Commissioners, and then at said time bids will be opened and read aloud for the Lower Little Miami Wastewater Treatment Plant Improvements Project.

Bid documents and specifications are available online at the Warren County's Website at <https://www.co.warren.oh.us/Commissioners/Bids/Default.aspx> Questions regarding the technical specifications should be directed to Chris Brausch at the Warren County Water and Sewer Department, (513) 695-1193. Contact the Warren County Commissioners Office at (513) 695-1250 should you need assistance in accessing the bidding information on the County web site.

The project generally consists of replacing two mechanically cleaned screens and two screenings compactors; replacing two secondary clarifier drives; replacing two secondary clarifiers' internal components complete, replacing a set of vertical loop reactor turning vanes; replacing a sludge holding tank aeration blower; and corresponding electrical, control, piping, site (mainly paving and asphalt resurfacing), and appurtenance upgrades to be installed within and around new and existing facilities. Recommissioning the existing abandoned 18-inch force main from the old Foster Pump Station for use as a backup forcemain for the new Foster Pump Station is also part of the project. The estimated contract value is \$3,000,000.

The Board of Warren County Commissioners reserve the right to accept the lowest and best bid, to reject all bids, and to waive any irregularities in bids.

By order of the Board of County Commissioners, Warren County, Ohio.

Tina Osborne, Clerk