
SECTION 5
SPECIFICATIONS

SECTION 011100 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 LOCATION OF THE PROJECT

- A. The project is located in the City of Jackson, Ohio.

1.2 PROJECT DESCRIPTION

- A. The bid documents contain bid forms for one (1) contract. The lift station upgrades and supply of the portable generator shall be awarded as one contract.
- B. The project consists of removing the existing power supply to the lift stations and providing and installing the following:
 - 1. Galvanized steel electrical stands
 - 2. New meter bases
 - 3. 4X stainless steel cabinet manual transfer switches with fuses
 - 4. Portable generator connections
 - 5. Electrical riser conduit and weatherhead
 - 6. All cable, wiring, etc. to make system functional
 - 7. One (1) portable 25 KW diesel-powered generator
- C. The following lift stations are in this proposal (see Plan cover sheet):
 - 1. Beaver Pike
 - 2. Payne Street
 - 3. Burlington Avenue
 - 4. Fannon
 - 5. 4-Mile
 - 6. Oak Hill Bank
 - 7. Pleasant View
 - 8. Florence Avenue
 - 9. Southview School

1.3 SPECIFICATIONS

- A. In general, these Specifications describe the work to be performed by the various trades, other than work specifically excluded. It shall be the responsibility of the Contractor and Subcontractors to perform all work incidental to their trade, whether or not specific mention is made of each item, unless such incidentals are included under another Item.
- B. It is advised that the Contractor and all Subcontractors familiarize themselves with the contents of the complete Specifications, particularly for the trades preceding, following, related or adjacent to their work.

1.4 DRAWING SCHEDULE

A. The work to be done under this Contract is shown on the following Drawings:

<u>Sheet No.</u>	<u>Title</u>
1	Title Sheet
2	General Notes
3	Lift Stations Payne St., Burlington Rd., Fannon, 4 Mile, Beaver Pike
4	Lift Stations Oak Hill Bank, Pleasant View, Florence, Southwest Schools
5	Electrical One-Line Details and Schedules

END OF SECTION 011100

SECTION 011419 – USE OF SITE

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor will be allowed the use of as much of the site designated for the improvements as is necessary for his operation.

1.2 USE OF STREETS

- A. During the progress of the work, the Contractor shall make ample provisions for both vehicle and pedestrian traffic on any public street and shall indemnify and save harmless the Owner from any expense whatsoever due to their operations over said streets. The Contractor shall also provide free access to all the fire hydrants, water, and gas valves located along the line of his work. Gutters and waterways must be kept open or other provisions made for the removal of storm water. Street intersections may be blocked only one-half at a time, and the Contractor shall lay and maintain temporary driveways, bridges and crossings, such as in the opinion of the Engineer are necessary to reasonably accommodate the public.
- B. In the event of the Contractor's failure to comply with these provisions, the Owner may cause the same to be done, and may deduct the cost of such work from any monies due the Contractor under this Agreement, but the performance of such work by the Owner at its instance shall serve in no way to release the Contractor from his general or particular liability for the safety of the public or the work.
- C. The Contractor shall repair at no cost to the Owner, all existing roads, parking areas, grassed areas that are damaged due to the execution of his work. The Contractor shall remove daily all mud, soil and debris that may be tracked onto existing streets, drives, or walks by his equipment or that of subcontractors or suppliers.

1.3 CLOSING STREETS TO TRAFFIC

The Contractor may with the approval of the Engineer, close streets, or parts of streets, to vehicular traffic. The streets are to remain closed as long as the construction work or the condition of the finished work requires or as determined by the Engineer. The Engineer shall be the judge of how many streets or parts of streets it is necessary for the Contractor to close at any time, and may refuse to permit the closing of additional streets to traffic until the majority of the work on the closed streets is completed and they are opened to traffic.

1.4 RIGHTS-OF-WAY

- A. Whenever it is required to perform work within the limits of public or private property or in rights-of-way, such work shall be done in conformity with all agreements between the Owner and the owners of such. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.
- B. The Contractor shall not (except after consent from the proper parties) enter or occupy with men, tools or equipment, any land outside the rights-of-way or property of the Owner.
- C. When the Contractor performs construction within 10 ft. of a right-of-way or easement line, he shall place tall stakes properly identified at points of change in width or direction of the right-of-way or easement line and at points along the line so that at least two stakes can be seen distinctly from any point on the line.

1.5 EASEMENTS

- A. Where the work is to be constructed upon easements, such easements will be secured by the Owner without cost to the Contractor. The Contractor shall not enter upon or occupy any private property outside of the limits of the easements furnished.
- B. Care shall be taken to avoid injury to the premises entered, which premises shall be left in a neat and orderly condition by the removal of rubbish and the grading of surplus materials, and the restoration of said public or private property to the same general conditions as pertained at the time of entry for work to be performed under this contract.

1.6 PROTECTING EXISTING BUILDINGS, STRUCTURES AND ROADWAYS

- A. The Contractor shall, at his own expense, shore up and protect any buildings, roadways, utilities or other public or private structures which may be encountered or endangered in the prosecution of the work, and that may not be otherwise provided for, and he shall repair and make good any damages caused to any such property by reason of his operations. All existing fences removed due to the prosecution of the work shall be replaced by the Contractor. No extra payment will be made for said work or material, but the cost of this work must be included in the price stipulated for the work to be done under this contract.

1.7 SITE FACILITIES

- A. The Contractor shall furnish and place sufficient quantities of portable toilet facilities at locations convenient for use by the Contractor's personnel, Subcontractors, the Engineer, and the Owner.

1.8 RESTORATION

- A. The contractor shall restore all areas per the plans and specifications and if not specified, at least to the condition existing prior to the start of work.

END OF SECTION 011419

SECTION 013216 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 PROGRESS SCHEDULE

- A. Immediately after signing the Contract, the General Construction Contractor shall prepare a graphic progress schedule, indicating the work to be executed during each month and the rate of expected progress to secure completion on the agreed-upon completion date. The progress schedule shall be approved by the Engineer and Owner prior to starting work on the site. Copies of such graphic progress charts, upon which has been indicated the actual progress, shall be furnished to the Engineer with each requisition for payment.
- B. Should the rate of progress fall materially behind the scheduled rate of progress, and unless the delay is authorized by the Engineer, each offending Contractor shall furnish additional labor, work overtime, or take other necessary means required for completion of the work on the scheduled date. No additional compensation beyond the set Contract price shall be paid for action taken or overtime expense incurred in maintaining scheduled progress.

END OF SECTION 013216

SECTION 013323 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 GENERAL

- A. The Contractor shall submit detailed drawings, acceptable catalog data, specifications and material certifications for all equipment and materials specified or required for the proper completion of the work.
- B. The intent of these items is to demonstrate compliance with the design concept of the work and to provide the detailed information necessary for the fabrication, assembly and installation of the work specified. It is not intended that every detail of all parts of manufactured equipment be submitted, however sufficient detail will be required to ascertain compliance with the specifications and establish the quality of the equipment proposed.

Shop Drawings shall be sufficiently clear and complete to enable the Engineer/Architect and Owner to determine that items proposed to be furnished conform to the specifications and that items delivered to the site are actually those that have been reviewed.

- C. It is emphasized that the Engineer/Architect's review of Contractor's submitted data is for general conformance to the contract drawings and specifications but subject to the detailed requirements of drawings and specifications. Although the Engineer/Architect may review submitted data in detail, such review is an effort to discover errors and omissions in Contractor's drawings. The Engineer/Architect's review shall in no way relieve the Contractor of his obligation to properly coordinate the work and to Engineer/Architect the details of the work in such manner that the purposes and intent of the contract will be achieved. Such review by the Engineer/Architect shall not be construed as placing on him or on the Owner any responsibility for the accuracy and for proper fit, functioning or performance of any phase of the work included in the contract.
- D. Shop Drawings shall be submitted in proper sequence and with due regard to the time required for checking, transmittal and review so as to cause no delay in the work. The Contractor's failure to transmit appropriate submittals to the Engineer/Architect sufficiently in advance of the work shall not be grounds for time extension.
- E. The Contractor shall submit Shop Drawings for all fabricated work and for all manufactured items required to be furnished in the Contract in accordance with the General Provisions and as specified herein. Shop Drawings shall be submitted in sufficient time to allow at least twenty-one (21) calendar days after receipt of the Shop Drawings from the Contractor for checking and processing by the Engineer/Architect.
- F. It is the responsibility of each Prime Contractor to furnish to all other Prime Contractors and especially the General Construction Contractor reviewed Shop Drawings for guidance in interfacing the various trades; i.e., sleeves, inserts, anchor bolts, terminations, and space requirements.

- G. No work shall be performed requiring Shop Drawings until same have been reviewed by Engineer/Architect.
- H. Accepted and reviewed Shop Drawings shall not be construed as approval of changes from Contract plan and specification requirements.
- I. The Engineer/Architect will review the first and second Shop Drawing item submittals at no cost to the Contractor. Review of the third submittal and any subsequent submittal will be at the Contractor's expense. Payment will be deducted from the Contract amount at a rate of 2.8 times direct labor cost plus expenses.

1.2 SUBMITTAL PROCEDURE

- A. All required submissions shall be made to the Engineer/Architect by the Prime Contractor(s) only. Any data prepared by subcontractors and suppliers and all correspondence originating with subcontractors, suppliers, etc., shall be submitted through the Contractor.
- B. Contractor shall review and approve all Shop Drawings prior to submission. Contractor's approval shall constitute a representation to Owner and Engineer/Architect that Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data or assumes full responsibility for doing so, and that Contractor has reviewed or coordinated each Shop Drawing or sample with the requirements of the work and the Contract Documents.
- C. Submittal Preparation: Mark each submittal with a permanent label or page for identification. Provide the following information on the label for proper processing and recording of action taken:
 - 1. Location
 - 2. Project Name
 - 3. Contract
 - 4. Name and Address of Engineer/Architect
 - 5. Name and Address of Contractor
 - 6. Name and Address of Subcontractor
 - 7. Name and Address of Supplier
 - 8. Name of Manufacturer
 - 9. Number and Title of appropriate Specification Section
 - 10. Drawing Number and Detail References, as appropriate.
 - 11. Submittal Sequence or Log Reference Number.
 - a. Provide a space on the label for the Contractor's review and approval markings and a space for the Engineer/Architect's "Action Stamp".
- D. Each Shop Drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor:

Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements.

Signature

Date

Company

- E. Shop Drawings shall be submitted in not less than six (6) copies to the Engineer/Architect at the address specified at the Preconstruction Conference. Single mylar or sepia reproducible copies of simple Shop Drawings may be submitted with prior approval of the Engineer/Architect.
- F. At the time of each submission, Contractor shall in writing identify any deviations that the Shop Drawings or samples may have from the requirements of the Contract Documents.
- G. Drawings shall be clean, legible and shall show necessary working dimensions, arrangement, material finish, erection data, and like information needed to define what is to be furnished and to establish its suitability for the intended use. Specifications may be required for equipment or materials to establish any characteristics of performance where such are pertinent. Suitable catalog data sheets showing all options and marked with complete model numbers may, in certain instances, be sufficient to define the articles which it is proposed to furnish.
- H. For product which require submittal of samples, furnish samples so as not to delay fabrication, allowing the Engineer reasonable time for the consideration of the samples submitted. Properly label samples, indicating the material or product represented, its place of origin, the names of the vendor and Contractor and the name of the project for which it is intended. Ship samples prepaid. Accompany samples with pertinent data required to judge the quality and acceptability of the sample, such as certified test records and, where required for proper evaluation, certified chemical analyses.

1.3 REVIEW PROCEDURE

- A. Engineer/Architect will review with reasonable promptness all properly submitted Shop Drawings. Such review shall be only for conformance with the design concept of the Project and for compliance with the information given in the plans and specifications and shall not extend to means, methods, sequences, techniques or procedures of construction or to safety precautions or programs incident thereto.
- B. The review of a separate item as such will not constitute the review of the assembly in which the item functions. The Contractor shall submit entire systems as a package.
- C. All Shop Drawings submitted for review shall be stamped with the Engineer/Architect's action and associated comments.

- D. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Architect will review each submittal, mark to indicate action taken, and return accordingly. Compliance with specified characteristics is the Contractor's responsibility.

Action Stamp: The Engineer/Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. If Shop Drawings are found to be in general compliance, such review will be indicated by marking the first statement.
 2. If only minor notes in reasonable number are needed, the Engineer/Architect will make same on all copies and mark the second statement. Shop Drawings so marked need not be resubmitted.
 3. If the submitted Shop Drawings are incomplete or inadequate, the Engineer/Architect will mark the third statement, request such additional information as required, and explain the reasons for revision. The Contractor shall be responsible for revisions, and/or providing needed information, without undue delay, until such Shop Drawings are acceptable. Shop Drawings marked with No. 3 shall be completed resubmitted.
 4. If the submitted Shop Drawings are not in compliance with the Contract Documents, the Engineer/Architect will mark the fourth statement. The Contractor will be responsible to submit a new offering conforming to specific products specified herein and/or as directed per review citations.
- E. No submittal requiring a Change Order for either value or substitution or both, will be returned until the Change Order is approved or otherwise directed by the Owner.

END OF SECTION 013323

SECTION 017800 - FINAL COMPLIANCE AND SUBMITTALS

PART 1 - GENERAL

- 1.1 The following forms and related sign-offs shall be documented in accordance with provisions of the contract. These forms shall be completed by the Contractor and approved by the Owner before final retainer is approved for release. Forms for Items A to E will be attached to the Contractor's executed copy of the contract.
- A. Certificate of Substantial Completion (To be submitted at time of Substantial Completion).
 - B. Contractor's Certification of Completion.
 - C. Contractor's Affidavit of Prevailing Wage.
 - D. Consent of Surety Company for Final Payment.
 - E. Affidavit of Final Acceptance Date and Correction Period.
 - F. Before the OWNER will approve and accept the work and release the retainer, the CONTRACTOR will furnish the OWNER a written report indicating the resolution of any and all property damage claims filed with the CONTRACTOR by any party during the construction period. The information to be supplied shall include, but not be limited to, name of claimant, date filed with CONTRACTOR, name of insurance company and/or adjuster handling claim, how claim was resolved and if claim was not resolved for the full amount, a statement indicating the reason for such action.
 - G. DBE Subcontractor Participation Forms SR-EPA.7-8 (Applicable for WPCLF & WSRLA funded projects only).
 - H. CDBG Subcontractor List 017800 (Applicable for CDBG funded projects only).

END OF SECTION 017800

SECTION 099770 - SPECIAL COATINGS

PART 1 – GENERAL

1.1 SUMMARY

- A. Work covered by this Section includes the furnishing and application of paints, stains, primers, varnishes and other finish, decorative and protective coatings.
- B. Shop priming and factory prefinishing are required on some, but not necessarily all, of the items described in other sections.
- C. Extent of work:
 - 1. All new process equipment and process piping.
 - 2. All building and room surfaces as indicated on the plans or as scheduled.
 - 3. All conduits, ducts, drains, etc of other trades unless such product is deemed having an acceptable factory pre-finish, under the following conditions:
 - a. When specifically called out as requiring special coating protection.

1.2 DEFINITIONS

- A. Special coating systems are defined as those types of materials and methods of application requiring more than normal skills and techniques for mixing, handling and application, as specified in the "Painting" section.
 - 1. The term "special coating systems" as used in this section includes applied materials used in prime, intermediate and finish coats.
 - 2. The word "paint", as applied in this and or other Sections shall apply to all special coatings required herein for the protection of materials from corrosive environment, weathering processes, or for aesthetic or other reasons.
 - 3. The term "exposed surfaces" is defined to include areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, and similar components are in place in areas to be coated. Extend special coatings in these areas as required to maintain the coating system integrity and provide desired protection.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information including basic materials analysis and application instructions for each coating material specified.
 - 1. List each material and cross-reference to the specific coating and finish system and application. Identify each material by the manufacturer's catalog number and general classification.
 - 2. In the event that the submittal requests a substitution then the following ASTM test results from an independent testing laboratory for the referenced products shall be included:

ASTM B 117 Salt Fog
ASTM D 3359 (Method A and B) Adhesion Test
ASTM G8, Method A Cathodic Disbondment
ASTM D 4541 (Elcometer)
ASTM D 4060 Taber Abrasion
ASTM D 522 (Conical Mandrel)
ASTM D 3363 Pencil Hardness
ASTM D 2794 Impact
ASTM G 53 QUV Exposure
ASTM D 2240 Durometer, Shore D
ASTM D 870 Immersion (Potable Water)
ASTM E 96 Moisture Vapor Transmission
ASTM D 2370 Tensile Strength and Elongation
ASTM D 638 Tear Strength

- B. Manufacturer's representative color and texture sample cards shall be submitted to the Engineer at least 30 days prior to paint application. Contractor shall coordinate work so as to allow sufficient time for paint to be delivered to the job site.

1.4 QUALITY ASSURANCE

- A. **Single Source Responsibility:** Provide primers and other undercoat material produced by the same manufacturer as the finish coats. Use only thinners recommended by the manufacturer, and only within recommended limits.
- B. **Coordination of Work:** Review other sections of these specifications in which other coatings are to be provided to ensure compatibility of the total coatings systems for various substrates.
1. Upon request, furnish information on the characteristics of pre-primed materials, to ensure that provisions for specified finish coats can be appropriately applied.
 2. Notify the Engineer of any anticipated problems involved in using the coatings systems as specified.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Name or title of material.
 2. Federal Specification number, if applicable.
 3. Manufacturer's stock number and date of manufacture.
 4. Manufacturer's name.
 5. Contents by volume, for major pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Color name and number.
 9. Handling instructions and precautions.

- B. Store materials not in actual use in tightly covered containers at a minimum ambient temperature of 45 deg. F (7 deg. C) in a well ventilated area. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all necessary precautionary measures to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of stains.
- C. No material shall be applied unless the containers are opened in the presence of the Owner's Representative.

1.6 PROJECT CONDITIONS

- A. Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are above 45 deg. F (7 deg. C), unless otherwise permitted by manufacturer's printed instructions.
- B. Do not apply coatings in snow, rain, fog or mist, or when the relative humidity exceeds 85%, or to damp or wet surfaces unless otherwise permitted by manufacturer's printed instructions. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing with the coating operation.
 - 1. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and the temperature within the area can be maintained within limits specified by the manufacturer during application and drying periods.
- C. Report to responsible person such as safety personnel, General Trades Superintendent, etc., any condition which may pose a threat to the health and welfare of employees.
- D. Keep working area clean and safe.
- E. Obey all job site rules and regulations.
- F. Surfaces not to be painted; unless specifically stated otherwise:
 - 1. Face brick
 - 2. Pre-finished wall panels, partitions and ceiling tile
 - 3. Items with acceptable factory-applied final finish
 - 4. Concealed ducts, pipes and conduit.
 - 5. Glass, Aluminum, Copper, Bronze, Stainless Steel

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Tnemec Company, Inc., North Kansas City, Missouri
 - 2. Carboline Company, At. Louis, Missouri
 - 3. Sherwin Williams Company, Cleveland, Ohio

- ## 2.2 COATING SYSTEMS

Sherwin Williams Macropoxy 646 at 3.0-4.0 mils DFT

1. In situations where two colors do not have sufficient contrast to easily differentiate between them, a six (6) inch band of contrasting color shall be on one of the pipes at approximately thirty (30) inch intervals.

3.2 SURFACE PREPARATION

A. General:

1. Dislodge dirt, rust, plaster nibs, mortar spatter and other dry material by scraping or brushing. Remove dust and loose material by brushing, sweeping, vacuuming or blowing with high-pressure air.
2. Remove oil, wax and grease by scraping off heavy deposits and cleaning with mineral spirits or a hot trisodium phosphate solution followed by a water rinse.
3. Verify that surfaces to be coated are dry, clean and free of dust, dirt, oil, wax grease or other contaminants.

B. Non-Ferrous Metal:

1. SSPC-SPI solvent cleaning to remove all contaminants.

C. Ferrous Metal:

1. Enclosed: Remove loose rust, mill scale and other foreign matter by hand (SSPC-SP2) or power tool (SSPC-SP3) cleaning and apply specified coating before rusting occurs.
2. Non-Submerged, Architecturally Exposed: Society of Protective Coatings, SSPC-SP6 Commercial Blast.
3. Submerged Steel: Society of Protective Coatings, SSPC-SP10 Near White Blast.

D. Galvanized Metal:

1. Remove contaminants and protective mill coating by SSPC-SP1 Solvent Cleaning or steam cleaning. All surfaces shall be prepared by light brush blasting to achieve a minimum 1.0 mil abrasive blast profile

PART 3 - EXECUTION

3.1 PRE-WORK INSPECTION

- A. Examine surfaces to be coated and report conditions that would adversely affect appearance or performance of coating systems and which cannot be put into an acceptable condition by preparatory work specified in Paragraph 3.2.
- B. Do not proceed with surface preparation and application until surface is acceptable or authorization to proceed is given by the Owner's representative.

3.2 SURFACE PREPARATION

A. General:

1. Dislodge dirt, rust, plaster nibs, mortar spatter and other dry material by scraping or brushing. Remove dust and loose material by brushing, sweeping, vacuuming or blowing with high-pressure air.

2. Remove oil, wax and grease by scraping off heavy deposits and cleaning with mineral spirits or a hot trisodium phosphate solution followed by a water rinse.
 3. Verify that surfaces to be coated are dry, clean and free of dust, dirt, oil, wax grease or other contaminants.
- B. Non-Ferrous Metal:
1. SSPC-SPI solvent cleaning to remove all contaminants.
- C. Ferrous Metal:
1. Enclosed: Remove loose rust, mill scale and other foreign matter by hand (SSPC-SP2) or power tool (SSPC-SP3) cleaning and apply specified coating before rusting occurs.
 2. Non-Submerged, Architecturally Exposed: Society of Protective Coatings, SSPC-SP6 Commercial Blast.
 3. Submerged Steel: Society of Protective Coatings, SSPC-SP10 Near White Blast.
- D. Galvanized Metal:
1. Remove contaminants and protective mill coating by SSPC-SP1 Solvent Cleaning or steam cleaning. All surfaces shall be prepared by light brush blasting to achieve a minimum 1.0 mil abrasive blast profile

3.3 APPLICATION

- A. General: Apply special coatings by brush, roller, spray, squeegee, or other applicators in accordance with the manufacturer's directions. Brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
1. Coating colors, surfaces treatments and finishes are indicated in the "Schedules" of the contract documents.
 2. Provide finish coats that are compatible with the primers used.
 3. The number of coats and coating film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the coating manufacturer. Sand between coating applications where sanding is required to produce an even smooth surface in accordance with the coating manufacturer's directions.
 4. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces.
 5. Coat the back sides of access panels, removable or hinged covers, and similar hinged items, to match exposed surfaces.
- B. Minimum Coating Thickness: Apply each material at not thinner than the manufacturer's recommended spreading rate. Provide a total dry film thickness of the entire coating system as recommended by the manufacturer.
- C. Prime Coats: Before the application of finish coats, apply a prime coat, as recommended by the coating manufacturer, to material that is required to be painted or finished, and which has not been prime coated by others.

1. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- D. Brush Application: Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
 1. Apply primers and first coats by brush unless the manufacturer's instructions permit use of mechanical applicators.
- E. Mechanical Applications: Use mechanical methods for coating application when permitted by the coating manufacturer's recommendations, governing ordinances, and trade union regulations.
 1. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of 2 coats in one pass, unless recommended by the coating manufacturer.
- F. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or recoat work not in compliance with specified requirements.
- G. Spray application will not be permitted for the Primary Clarifier Painting bid item.

3.4 INSPECTION

- A. Request acceptance of each coat before applying succeeding coats.
- B. The Contractor shall furnish the Engineer a suitable thickness detector of a type recommended by the paint manufacturer.
- C. Any field painting found to be defective shall be removed and the surfaces repainted as the Engineer may direct at no additional cost to the Owner.
- D. Before final approval of the work, all damaged surfaces of paint (field or factory applied) shall be cleaned and repainted or touched up as directed.

3.5 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following material testing procedure at any time, and at any number of times during the period when coating operations are being conducted.
 1. The Owner will engage the services of an independent testing laboratory to sample the coating being used. Samples of material delivered to project site will be taken, identified and sealed, and certified in the presence of the Contractor.
 2. The testing laboratory will perform appropriate tests for any or all of the following characteristics as required by the Owner:
 - a. Quantitative materials analysis.
 - b. Absorption.
 - c. Accelerated weathering.

3.6 CLEANING

- A. Clean-Up: At the end of each work day during progress of work, remove rubbish, empty cans, rags and other discarded materials from the site.
 - 1. Upon completion of the work, clean window glass and other spattered surfaces. Remove spattered coatings by washing, scraping or other proper methods, using care not to scratch or otherwise damage adjacent finished surfaces.

3.7 PROTECTION

- A. Protect work of other trades, whether to be coated or not, against damage from coating operations. Correct damage by cleaning, repairing or replacing, and recoating as acceptable to the Engineer. Leave the work in an undamaged condition.
- B. Provide "Wet Paint" signs as required to protect newly-coated finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of coating operations.
 - 1. At completion of the work of other trades, touch-up and restore damaged or defaced coated surfaces.

END OF SECTION 099700

SECTION 263213 – STANDBY TOWABLE/PORTABLE GENERATOR SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 26, Section 260000, Electrical General Provisions, and Section 260500, Basic Materials and Methods, apply to work of this section.
- C. NFPA 30
- D. NFPA 110
- E. Ohio Fire Code

1.2 CONTENTS

- A. Described herein are the requirements for the standby towable electrical generator system: See following.

1.3 SCOPE

- A. The extent of generator system work is indicated on the drawing and by requirements of this section.

PART 2 - PRODUCTS

2.1 240 VOLT, 3 PHASE 25 kW TOWABLE STANDBY ELECTRICAL GENERATOR

A. GENERAL

- 1. The generator set shall be a prototype tested, factory built, production tested, site tested, of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified herein. The equipment supplied and installed shall meet the requirements of the National Electrical Code, U. L. and all applicable codes and regulations. All equipment shall be by a U. S. firm which manufactures the generator and controls, and assembles the standby generator sets as a matched unit so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained service personnel.

2. These specifications are based on a Kohler Model 35REOZT4 with the following options. Other manufacturer's listed below may have similar products.
 - a. 120/240V, 3 Ph, 60 Hz, Order Option B with reconnectable alternator
 - b. Battery charger
 - c. Cold Weather Package
 - d. Camlock Style Load Connectors, Color Coded
 - e. Trailer
 - f. Spare Tire
 - g. Wheel Chock Blocks
 - h. General Maintenance Literature
- B. AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Caterpillar; Engine Division
 2. Generac Power Systems, Inc.
 3. Kohler Co.; Generator Division
 4. Cummins Power Generation; Industrial Business Group
- C. Shop drawing submittal shall include specification sheets showing all standard and optional accessories to be supplied, performance data, schematic wiring diagrams, dimension drawings, and interconnection diagrams identifying by terminal number each required interconnection between the generator set, and remote devices included elsewhere in these specifications. Provide documented compliance that diesel engine meets current Tier 4 emissions standards. Include generator sizing calculations confirming selected generator is adequate for project
- D. Testing: To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer shall be responsible for design prototype tests as described herein: Components of the system, such as the engine/generator set, transfer switch, and accessories shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similar design prototypes which will not be sold shall be used for these tests. Prototype test programs shall include the requirements of NFPA-110 and the following:
 1. Maximum power (kW)
 2. Maximum starting (kVA) at 35% instantaneous voltage dip.
 3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40
 4. Governor speed regulation under steady-state and transient conditions
 5. Voltage regulation and generator transient response
 6. Fuel consumption at 1/4, 1/2, 3/4, and full load
 7. Harmonic analysis, voltage wave-form deviation, and telephone influence factor
 8. Three (3) phase line-to-line short circuit test
 9. Alternator cooling air flow
 10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses
 11. Endurance testing

- E. **Warranty:** The generator system shall be warranted by the manufacturer for one (1) year from the date of acceptance by the owner
- F. Furnish a proposal to the owner for a service and maintenance agreement for time past the requirements of the warranty

2.2 ENGINE-GENERATOR SET

- A. The electric generating set shall include a diesel fueled liquid cooled electric plant rated at 240 volts, three (3) phase, three (3) wire, 60 hertz. The continuous standby rating shall be as shown on manufacturer sizing calculations. It shall be a package unit of new and current equipment consisting of a diesel fueled engine-driven electric plant with engine mounted start-stop control system, and other mounted accessories as specified. Generator shall comply with current EPA Tier 4 emissions standards.
- B. The engine shall be diesel fueled with radiator and fan for cooling, alternator, governor, and oil lubrication system. Engine and generator shall be mounted on common structural steel base with vibration isolation. Intake and free-turn exhaust valves shall be heat resisting alloy steel with high tungsten-chrome alloy steel exhaust valve seat inserted. Full pressure lubrication shall be supplied by a gear oil pump. The engine shall have an oil filter with replaceable element, dipstick and oil drain. Engine speed shall be governed by an electronic governor to maintain alternator frequency within one-half of one percent from no-load to full-load alternator output
- C. An electrical distribution panel shall be located with the genset controls with the following:
 - 1. Viewable generator set controller with security cover
 - 2. Emergency stop switch
 - 3. Shore power connector, 120V, 15 amp (for battery charger and battery heater)
 - 4. Shore power connector, 120V, 15 amp (for block heater)
 - 5. Remote start connection
 - 6. Mobile paralleling box connection
 - 7. Main line circuit breaker rated at 150 amps, field adjustable
 - 8. Color-coded camlock connectors
- D. Supplier shall provide a set mounted auto start digital control panel. The control panel shall be the supplier's standard and comply with NFPA 110 Level 1.
- E. The fuel system shall be a dual wall fuel tank design. The complete fuel tank shall be integral with the genset base frame allowing the genset to be removed from the trailer while still providing the specified run time without need for external fuel tanks. The fuel system shall have the capacity to run for a minimum of 24 hours at 100% of rated prime power load. A lockable fuel fill shall be provided. A manual fuel priming pump integrated into the fuel filter shall be provided for ease of starting.
- F. The lubrication system shall come complete with spin-on lube oil filters, lube oil cooler, crankcase breather with collection assembly, and lube oil. The oil drain lines shall be routed to the base of the unit and include valves to simplify the oil change process.

- G. An internally mounted critical silencer with vertical exhaust discharge shall be provided. Heat guards shall be provided to protect personnel from exhaust heat per OSHA standards.
- H. The starting system shall consist of a 12 volt system with a heavy duty alternator, and starter motor on engine. A 12 volt heavy duty maintenance free battery, battery rack, and cables shall be provided. A UL Listed 120 VAC battery tender shall be mounted on the genset and shall be wired to a shore power connection. Tender shall be sized to keep battery charged while the genset is stored.
- I. The generator set shall come with a liquid cooling system. The package mounted, cooling system shall be complete with radiator, blower fan, fan drive, drive guard, belt guards and shall be filled with coolant antifreeze with corrosion inhibitor. The cooling system shall also include a coolant level reservoir/sight gauge and coolant drain line routed to the exterior of the package with shutoff valve. A 120 VAC, thermostatically controlled coolant heater shall be provided to ensure specified engine start capability under cold environmental conditions. The coolant heater shall be wired to a shore power connection. The coolant heater shall be compatible with all approved engine coolant additives and shall be sized to keep coolant warm while the genset is stored.
- J. The generator set shall come with a fully weatherproof and sound attenuated enclosure that shall provide sound attenuation of 67 dBA at 23ft. The enclosure shall come with hinged side panels to allow for inspection and maintenance. The enclosure shall be coated with primer and two coats high-gloss weatherproof, sag resistant vinylac in the manufacturer's standard colors.
- K. The generator set shall be mounted on a single axel towing style trailer. The trailer shall comply with Federal DOT's Federal Motor Vehicle Safety Standards. It shall be equipped with a hitch that is compatible with city vehicles. The trailer shall be equipped with a electrically-actuated surge brakes. A spare tire shall be provided and mounted to the trailer. Electrical connection shall be compatible with city vehicles and shall operate trailer brakes, brake lights and turn signals. The trailer construction shall be of ASTM A36 Grade structural steel. Fenders shall be 12 gauge galvanized steel, roll-formed and bolt-on. The trailer shall be coated with an epoxy ester high solid enamel primer, then finish painted with polyurethane, two component, high-solid enamel in gloss black.
- L. The generator set shall be provided with a 25 foot long cord. The cord shall be provided with color-coded cam lock load connectors on one end. The cord set shall be rated for 240 volt, 3 phase with ground, 150 amps.
- M. Unit shall be 100% load bank tested for four (4) hours at the site before acceptance by the owner. Factory tests are not acceptable. Tests shall include:
 - 1. Single step load pickup.
 - 2. Transient and steady-state governing.
 - 3. Safety shutdown device testing.
 - 4. Voltage regulation.
 - 5. Submit all recorded test data in Operation and Maintenance Manual.
- N. Submit complete shop drawings.

- O. Engine Exhaust Emissions: Comply with all applicable federal, state and local government requirements at the location of the installation, as of the effective dates of regulations, and dates of manufacture and installation. Include all equipment required to comply with the regulations. In addition, in no case shall required EPA Tier and emission levels be exceeded.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. Site Tests. Start-up, load bank, and lift station load tests shall be performed by the manufacturer's local representative. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test.
- B. Record all test results and submit with Operation and Maintenance Manuals.

3.2 OPERATION AND MAINTENANCE MANUAL

- A. Prior to, or with the delivery of the generator, the manufacturer shall provide one (1) hard copy and one (1) electronic copy of an operation and maintenance manual including storage, installation, start-up, operating and maintenance instruction and a complete parts list and recommended spare parts list. The O&M manual shall be in compliance with the General Requirements.

END OF SECTION 263213

SECTION 260000 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 REFERENCE

- A. The provisions of the Instructions to Bidders, General Conditions, Supplementary Conditions, Alternates, Addenda, and Division 1 are a part of this specification. Contractors and Subcontractors shall examine same as well as other Divisions of the specifications which affect work under this Division.
- B. The requirements of this Section shall govern all Division 26 work for this project. Bidders are referred to in this section as "Electrical Contractors" and all provisions apply to each contractor and their subcontractors.
- C. The contractor shall be solely responsible for construction means, methods, sequences of construction and the safety of workmen.

1.02 DESCRIPTION OF WORK

- A. Mechanical, Civil, Structural, Electrical and all other project drawings, as well as the Specifications for all the Divisions, are a part of the Contract Documents. Work of this section is shown on the electrical drawings.
- B. Drawings and Specifications are to be considered as supplementing each other. Work specified but not shown, or shown but not specified, shall be performed or furnished as though mentioned in both Specifications and Drawings. All systems shall be complete and fully operational upon completion of the project.
- C. Contractors shall not construe any correspondence or verbal communications with or by the engineer or his representative as authorization for "extra" construction payment. All requests for additions to this contract shall be submitted in writing by the contractor to the architect for consideration by the owner's representative. Work performed without written change order from the owner will be the contractor's sole responsibility without additional compensation.
- D. Contractor shall comply with and schedule work according to the schedule of construction specified in Division 1. All work shall be completed within these time constraints and the contractors for the work of this section shall provide all required temporary utilities and connections necessary to maintain the existing systems in full operation during the progress of this work. Sections of any systems may be taken out of service only when approved in writing by the owner.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Division 1 - Project Phasing and Temporary Electrical Service

B. Division 3 - Poured-In-Place Concrete

C. Division 9 - Finish Painting

1.04 QUALITY ASSURANCE

A. Codes and Permits:

- 1) Work shall be installed in full accordance with all applicable codes, rules and regulations of public authorities and/or utilities. Included shall be National Electrical Code, NEMA, U. L. Standards, OSHA, State and local Building Codes. All these Codes, Rules and Regulations are hereby incorporated into this specification.
- 2) Comply with specification requirements in excess of Code requirements where no conflicts exist.
- 3) Prior to starting any work, electrical contractors shall secure all necessary permits and inspection certificates required. All fees for permits, utility connection charges, inspections and certificates shall be paid for by electrical contractors.
- 4) Deliver official record of approval, by governing agencies, to project manager for transmittal to owner, prior to starting work.

B. Standards:

- 1) Comply with all city standards and applicable provisions of code approved editions of following National Standards:
NFPA 70E Electrical Safety in the Workplace
National Electrical Code
NFPA Life Safety Code and Standards under
Appendix B of Life Safety Code
Underwriters Laboratory
NFPA
NEMA
National Electrical Safety Code
ANSI
Americans with Disability Act

1.05 SUBMITTALS

A. Shop Drawings:

- 1) Contractor shall submit shop drawings of generator, distribution equipment and electrical devices for review. Submittals shall be made in a timely fashion, keeping with the project schedule described in Division 1.
- 2) Contractor shall review and indicate his approval of each shop drawing prior to submittal for review. Do not start work until shop drawings have been reviewed by the Engineer and returned to the Contractor. Submittals not indicating contractor approval will be returned without review.

- 3) Submittals will be reviewed only for general compliance with the contract documents and not for dimensions, quantities, etc. The submittal review shall not relieve the contractor of responsibility for purchase of the item in full compliance with the contract documents and its complete and proper installation.
- 4) Where submittals vary from the contract requirements, the contractor shall clearly indicate on submittal or accompanying documents the nature and reason for variations.
- 5) Refer to various sections for listing of shop drawings required on this project which are not listed in A.1 above.
- 6) Each manufacturer or his representative must check the application of his equipment and certify at time of shop drawing submittal that equipment has been properly applied and can be installed, serviced and maintained where indicated on drawings. Advise engineer in writing with submittal drawings of any potential problems. The manufacturer shall be responsible for any changes that might be necessary because of physical characteristics of equipment that have not been called to the engineer's attention at the time of submittal.

B. Record Drawings:

- 1) Each contractor or subcontractor shall keep one (1) complete set of the contract working drawings on the job site on which he shall regularly record any deviations or changes from such contract drawings made during construction.
- 2) These drawings shall record the location of all electrical equipment, junction and pull boxes, conduit routing and all below-grade service. All underground services shall be dimensioned from readily identifiable and accessible elements.
- 3) Record drawings shall be kept clean and undamaged and shall not be used for any purpose other than recording deviations from working drawings and exact locations of concealed work.
- 4) After the project is completed, these sets of drawings shall be delivered to the project manager in good condition, as a permanent record of the installation as actually constructed.

1.06 COORDINATION AND SUPERVISION

- A. Examine work of other trades which comes in contact with or is covered by the work. Do not attach to, cover, or finish against any defective, or install work of this Division in a manner which will prevent other trades from properly installing their work. Consult all drawings, specifications and details of other Divisions of the work.
- B. Proper clearances for equipment access and service shall be maintained for all items and components.

- C. Contractors shall report any interferences between their work and other work or construction as soon as discovered. If contractor proceeds without coordination, correction shall be the responsibility of the installing contractor without cost to the owner.
- D. Drawings are diagrammatic and show approximate location of conduit, devices, etc. Take all measurements and establish exact locations in the field. Adapt to construction and work of other trades as required for coordination of the work.
- E. Each contractor shall be responsible for layout and coordination of openings and chases required for these installations, which are provided by other trades. Provide dimensioned drawing and fully coordinate this work with the contractor providing the openings or chase.
- F. Each contractor shall provide adequate competent supervision on job during all working hours with authority and instructions to answer questions and carry out instructions.
- G. The owner reserves the right to make reasonable changes in the location of electrical devices up to the time of roughing-in, without additional cost.

1.07 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are supplemental to each other. It is intended that work covered by these specifications and drawings include everything requisite and necessary to make the various systems complete and operative, irrespective of whether or not every item is specifically provided for. Any omission of direct reference herein to any essential item shall not excuse contractor from complying with the above intent.
- B. In case of error or inconsistency, specifications shall take precedence over drawings. Figured dimensions supersede scaled ones. Contractor shall take no advantage of, and shall promptly call attention to any error, omission or inconsistency in specifications and drawings.
- C. Special attention is directed to requirements that equipment and materials stated in specifications and/or indicated on drawings shall be furnished, completely installed, adjusted and left in safe and satisfactory operating condition. Accessories, appliances and connections necessary for proper operation of equipment shall be provided.
- D. Materials, apparatus or equipment specified or otherwise provided for on drawings, addenda, or change orders issued subsequent to award of contract, shall be same brand, type, quality and character originally specified, unless specifically approved.
- E. Layout of equipment, accessories, specialties and piping systems are diagrammatic, unless dimensioned. In preparing shop drawings, contractor shall check project conditions before installing work. If there are any interferences or

conflicts, they shall be called to the attention of project manager immediately for clarifications.

- F. The drawings indicate required size and points of termination of conduit and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. However, it is not intended that drawings indicate all necessary offsets and it shall be the work of the installing contractor to make the installation in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instruction or cost to the owner.
- G. It is intended that the electrical items be installed level, plumbing and square. Confirm all locations with owner prior to rough-in of any equipment.

1.08 PROVISIONS FOR LATER INSTALLATION

- A. Become acquainted with nature and progress of construction against which this work attaches. Review civil drawings for coordination of openings.
- B. When this work cannot be installed concurrently with the lift station construction, arrange for inserts, sleeves, access panels, etc., as necessary for installation at a later date.

1.09 LOCAL CONDITIONS

- A. Visit site and become familiar with facilities and conditions affecting work. No additional payment will be made on claims that arise from lack of knowledge of existing condition.
- B. Exercise extra care when working in areas where underground services may exist. Any costs for repair of damage to such services become responsibility of Contractor causing damage.

1.10 PROTECTION

- A. When setting up equipment, protect area against staining, abrasion. Cost of correcting any such condition will be charged against the respective Contractor.
- B. Protect all equipment which has been installed from construction debris and the work of other trades.
- C. Protect concrete pads from chips and cutting oil by use of chip receiving pan and oil proof cover.
- D. Protect equipment and finished surfaces from welding and cutting spatters with baffles and spatter blankets.
- E. Protect from paint droppings, by use of drop cloths.

- F. Contractors shall be responsible for including and maintaining adequate precautions and safeguards related to their work during all phases of construction. Include protection, warnings and safety devices and equipment for protection of personnel, equipment and materials. Comply with all requirements of governing authorities, including OSHA.

1.11 PRODUCT HANDLING

- A. Pay all costs for transportation of materials, equipment to job site.
- B. Provide all scaffolding, tackle, hoists, rigging necessary for placing electrical materials and equipment in their proper place. Remove temporary work when no longer required. Comply with applicable State, Federal and local regulations.
- C. Contractor shall keep materials clean and protected from weather and/or damage before and after installation until final acceptance by the owner. Protect all openings, bearings, controls, motors, etc., from dirt and moisture.

1.12 UTILITY TIE-INS

- A. Make all utility tie-ins for this project in accordance with requirements of authorities having jurisdiction.
- B. Fully coordinate service interruptions with all parties involved for shutdown and/or tie-ins with existing systems to minimize interruption of service. Fully coordinate and make connections to existing facilities as scheduled with the owner and governing authorities.
- C. Include all necessary arrangements and overtime required to make necessary tie-ins without disrupting service to existing pumping equipment for a maximum period of four (4) hours during the normal working day.
- D. Contractor shall confirm all utility requirements for tie-in prior to bid and include all facilities required by utility for fully coordinated and complete installation. Pay all charges, permit fees and assessments for utility connections.

1.13 SHUTDOWNS

- A. Give five (5) working days' notice to the Owner of anticipated shutdown requirements of an operating system. Tie-ins and modifications to existing facilities and services must be done with minimum interruption of operation and during hours so affecting.

1.14 EXISTING SERVICES

- A. Active services encountered in work shall be protected and supported. Inactive services encountered shall be removed or deactivated.

- B. All costs for repair of damages to active services shall be paid by the contractor causing the damage.

1.15 TEMPORARY SERVICES

- A. Temporary services shall be provided as stated in Special Conditions and Division 1. Provide all temporary services and connections as required to accommodate the phasing sequence of the project.
- B. Description of System: Furnish and install temporary electrical power service for construction needs throughout construction period in accordance with the special conditions as follows:
 - 1) Provide power for miscellaneous tools and equipment, for pumping and for temporary storage and construction buildings. See General Conditions for requirements of temporary service.
 - 2) Provide temporary lighting of minimum 5 foot candles for safe and adequate working conditions throughout the project, for security and for temporary office and construction buildings.
- C. Materials (General)
 - 1) Comply with Electrical - Basic Materials and Methods.
 - 2) Materials shall be new and must be adequate in capacity for required purposes, and must not create unsafe conditions or violate requirements of applicable codes.
 - 3) At Contractor's option, patented specialty products may be used, if UL approved.
 - 4) Provide required facilities, including transformers, conductors, poles, conduits, raceways, breakers, fuses, switches and lighting fixtures with lamps.
 - 5) Provide appropriate enclosures for environment in which used, in compliance with NEMA standards.
- D. Installation
 - 1) Install work in neat and orderly manner.
 - 2) Make structurally and electrically sound throughout.
 - 3) Maintain to give continuous service and to provide safe working conditions.
 - 4) Modify and extend service as work progress requires.
 - 5) Locate so that power is available at any desired point with no more than 100' (30.00 m) extension, and with no more than 5% voltage drop at full load.
 - 6) Provide circuit breaker protection for each outlet. Provide ground fault interrupting capacity for all circuits.
 - 7) Provide equipment grounding continuity for entire system.
 - 8) Removal: Completely remove temporary materials and equipment upon completion of construction. Repair damage caused by installation, and restore to specified or original condition.

1.16 OPERATING INSTRUCTIONS

- A. Owner's representative shall be instructed by contractor and manufacturer's representatives on system maintenance and operation requirements. Instruction shall be complete, conducted by qualified service and maintenance specialists. Notify project manager of scheduled instruction session to permit his attendance at the session.
- B. The following systems shall include training sessions scheduled with the owner. Allow a minimum of two (2) one-hour sessions, scheduled one week apart. Include initial programming of all time-of-day set points for operation.
 - 1) Generator system.

1.17 DAMAGE AND EMERGENCY REPAIRS

- A. Contractor shall be held responsible for damage to work caused by his work or through the negligence of his workmen. All patching and repairing of damaged work and the cost of same shall be paid by the contractor causing the damage. All existing facilities and installations shall be restored to their original condition when damaged by the work of this Division, using workmen skilled in each required trade.
- B. The owner reserves the right to make emergency repairs as required to keep equipment in operation, without voiding Contractor's warranty or relieving him of responsibility during warranty period.

1.18 WARRANTY

- A. Electrical Contractors shall warrant all material, equipment, fixtures and workmanship for a period of one (1) year from date of final acceptance.
- B. Any equipment or other component part of system which fails during warranty period and all resulting damage shall be replaced or repaired by contractor without cost to owner.
- C. Warranty on any repairs or replacements shall be extended from date of replacement or repair of that item for one (1) year.
- D. All equipment shall be warranted by the manufacturer thru the contract warranty period. Any extended manufacturers warranties shall be extended to the owner.

1.19 REQUIREMENTS FOR FINAL INSPECTION

- A. All of the following items must be completed prior to final inspections. No exceptions will be made and no final payment will be made until all items are completed.

- 1) Each contractor's foreman shall perform his own punch list and, upon completion, notify the project manager that project is ready for final punch list.
- 2) Thoroughly clean all parts of the apparatus and equipment. Exposed parts which are to be painted shall be thoroughly cleaned of cement, plaster and other materials and all oil and grease spots shall be removed. Such surfaces shall be carefully wiped and all cracks and corners scraped out.
- 3) Exposed metal work shall be carefully brushed down with steel brushes to remove rust and other spots and left smooth and clean.
- 4) All labeling of system components as required in this Section and Section 260500, the drawings and the owner shall be complete.
- 5) All system start-ups shall be complete with written certifications submitted for all systems and major equipment.
- 5) Certification of test and start-up and training sessions for the systems listed in operating instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide material and labor which is neither drawn nor specified but which is obviously a component part of and necessary to complete work or comply with code, and which is customarily a part of work of similar character.
- B. Provide incidental concrete, trenching and backfilling, reinforcing steel, masonry, mortar, miscellaneous steel, painting and the like required to complete electrical installations; perform in manner specified in applicable Division of General Trades Specification by workmen skilled in that particular trade.
- C. All equipment and material shall be new, free from defects, U.L. listed, and warranted by the manufacturer and the contractor.
- D. To the greatest extent possible, provide materials and products of the same kind from the same manufacturer for this project.

2.02 MATERIAL SUBSTITUTIONS

- A. All changes required by substitutions, such as revisions to foundations, bases, conduit, controls, wiring, openings and appurtenances shall be made by the substituting contractor at no additional cost to the project. Notify all other contractors affected by substitution and pay all costs related to the substitution incurred by other contractors.
- B. Systems have been laid out around particular equipment considered base items. Manufacturer first listed is base item. Other named manufacturers in these specifications or on the drawings who can provide equivalent equipment are acceptable and may be bid, provided performance, construction, components, quality and appearance, where applicable, are equivalent to base item and can be

properly installed. Acceptable alternate makes of equipment are listed in specifications or equipment schedules; however, manufacturers other than base manufacturers are substitutions and shall comply with the following paragraphs. When distribution equipment is substituted, contractor shall submit equipment shop drawings showing dimensions of equipment and required N.E.C. clearance. It is the contractors sole responsibility that all substituted equipment fits in the allotted space and maintains all required clearances.

- C. Should the contractor propose to furnish materials or equipment other than those listed in the specification, a written request for substitution shall be submitted as an alternate to the base bid at the bid opening. Refer to General Conditions Division of this specification. It is the contractor's responsibility to fully evaluate substitutions and ascertain that the substitution is equivalent in all respects to the base specification prior to submittal.
- D. Substitutions are subject to approval of project manager and owner and their decision shall be final. In submitting substitutions, include make and model number and complete literature and performance data for evaluation.
- E. Substitution of items not named in these specifications or drawings may be offered for consideration in the Proposal Form of the contract, under the following conditions:
 - 1) The proposed substitution is proven, to the satisfaction of the Project Engineer, to be equal or superior to the specified item in all respects.
 - 2) Extended delivery schedules on specified items, which would delay timely completion of the job, will be cause for consideration of substitutions. The Contractor must show proof of delay in delivery from the manufacturer.
 - 3) Changes required by substitution, such as revisions to foundations, bases, conduit, controls, wiring, openings and appurtenances shall be made by the Contractor at no additional cost to the project and pay all costs related to the substitution incurred by other contractors.
 - 4) State the amount of credit to be given to the owner if the substitution is accepted prior to contract award on the proposal form or if after award of contract, submit a quotation stating cost reduction resulting from acceptance of a substitution if executed through a contract change order.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. Location of conduit, equipment, devices, etc., on the drawings are diagrammatic; indicated positions shall be followed as closely as possible, exact locations shall be subject to construction and interferences with other work. Difficulties preventing the installation of any part of work as indicated shall be called to the attention of the project manager. Project manager shall determine locations and changes, Contractor shall install the work accordingly. Project manager reserves right to make minor changes in location of any part of the work up to the time of roughing-in without additional cost.

- B. All materials and equipment shall be installed in a neat and workmanlike manner by competent specialists for each subtrade. The installation of any materials and equipment not meeting these standards may require removal and reinstallation at no additional cost to the Owner.
- C. Install, connect equipment, services, materials in accordance with best engineering practice and in conformity with manufacturer's printed instructions and U.L. Listing.
- D. Take all measurements and determine all elevations prior to fabrication or rough-in.

3.02 CUTTING AND PATCHING

- A. Perform all cutting, framing and patching in completed construction as necessary for installation of this work. Do not cut any structural member. Have cutting done by skilled mechanics as carefully as possible, and with as little damage as possible. Have patching done by first-class mechanics, skilled in the several trades.
- B. In new construction, lay out location and size of all openings to be provided by other trades in advance of their work. Set sleeves, etc., for openings and provide layout dimensioned drawings as required for coordination with other contractors. If openings information and sleeves are not provided to other trades in advance of their work, this contractor shall provide all required openings as required for existing construction.
- C. In existing construction, contractor shall perform all cutting, patching and framing of chases and openings required by this work.
- D. Perform all excavation and backfill required for installation of below-grade conduits. Excavate to depth required to install conduits at required level and pitch. All backfill shall be compacted in maximum twelve (12) inch layers and conform to all bearing requirements of site and/or structure above. Trenches for utility services shall comply with the specifications and details of the utility company.

3.03 PAINTING

- A. Finish painting is included under Division 9 - Finishes, except where specifically called for under this Division.
- B. Certain painting specified as part of the electrical Trades Work is included herein and shall comply with Division 9.
- C. Materials and equipment installed under this Division shall be left free from dirt, grease and foreign matter, ready for painting.
- D. No equipment or piping shall be painted before being tested.

- E. Damaged surfaces of prefinished materials and equipment shall be touch-up painted to match existing finish by the contractor.
- F. All items to be painted shall be primed and painted with two (2) coats of rust inhibitive paint in accordance with the paint manufacturer's instructions. City shall select a custom color.

3.04 EQUIPMENT IDENTIFICATION

- A. Equipment:
Safety switches, manual transfer switches and special outlets, etc., shall be identified as to function with a phenolic engraved nameplate securely attached. Identify voltage, phase, origin and load served.
- B. Nameplates shall be laminated phenolic with a black surface and white core and shall be mechanically fastened with screws to each item. Use 1/16" thick material for plates up to 2"x4". For larger sizes, use 1/8" thick material. Lettering shall be minimum 1/4" height, spaced at four (4) per inch. Safety switches and nameplates shall include system voltage, phase and circuit origin and load served.
- C. Wiring:
 - 1) Color code all wiring in accordance with NEC Standards. All system and control wiring shall be labeled at each termination and splice, and continuously color coded.
 - 2) Color coding is to be plainly labeled on all wiring diagrams submitted for approval and wire installed by this contractor shall comply with manufacturer's wiring diagram requirements.
- D. Label all conduits where exposed with stick-on labels indicating circuit contained.

3.05 OPERATING AND MAINTENANCE MANUAL

- A. Prepare three (3) complete operating and maintenance manuals in hardback binders describing operation of the systems and recommended maintenance schedule. Turn all equipment warranties over to the Owner.
- B. Manuals shall be indexed, arranged in the CSI format, and include:
 - 1) Job name and names of contractor with address and telephone number for service. Include all major emergency service numbers for equipment and generator set particularly.
 - 2) Manual index.
 - 3) Identification, name, mark, number as indicated on design drawings.
 - 4) Normal equipment operating characteristics.
 - 5) Performance data and ratings.
 - 6) Wiring diagrams.
 - 7) Manufacturer's descriptive literature.
 - 8) Manufacturer's maintenance and service manuals. Include signed copies of attendance sheets for each owner instruction session.
 - 9) Spare parts and replacement parts list for each piece of equipment.

- 10) Name of service agency and installer.
- 11) Final accepted shop drawings.

3.06 CLEANING UP

- A. From time to time during the operations and at completion thereof, electrical contractor shall remove from the premises all debris and excess material caused by their work. Area of operation shall be left broom clean.
- B. Construction materials shall be neatly stored in project areas and locations designated by the owner. Construction materials must not be left scattered about construction area.
- C. All electrical equipment to be painted shall be thoroughly cleaned by electrical contractors of grease, rust, shipping tags and construction dirt.

3.07 TEST, CHECK, START AND BALANCE

- A. The electrical contractor shall test, check and start up all systems installed under this contract and place them in operating condition. Testing may be done by qualified employees of the contractor except where independent testing company is specified (see paragraph F. below).
- B. All electrical equipment shall be cleaned and labeled.
- C. Circuits shall be phased out and connected to the main switch in proper manner. Loads shall be distributed within 5% between phases when all loads are energized. All wires shall be entirely free from grounds and short circuits.
- D. Distribution voltages shall be checked by this contractor who shall advise the engineer in writing in the event that incoming voltages are not within a tolerance of plus or minus 5% of nominal value. Adjust taps on transformer if required to correct voltage variations or coordinate with serving utility to adjust incoming service voltage.
- E. Upon completion of the work, deliver to owner all special tools, keys, fuses and other detachable portions of the electrical system. Obtain written receipt from owner's representative and submit with request for final payment.

3.08 DEMOLITION

- A. This contractor shall perform all demolition of existing electrical systems as indicated on electrical plans or necessary for project. Remove from site and properly dispose of all material and debris from this work.
- B. Demolition drawings are general in nature showing the scope of demolition work. Contractor shall visit the site and become familiar with the existing conditions. Remove all equipment and devices no longer required for finished construction. All existing conduit, wire and devices in project areas shall be removed and disposed of.

Remove conduits beyond new surfaces. Remove all existing wire from conduit back to point of common use.

- C. The electrical contractor is to inspect existing conditions and equipment for current code violations and include in bid the amount to correct these violations.
- D. The owner reserves the right of salvage for all existing electrical equipment. Prior to demolition, the contractor shall review all materials and deliver to the owner those required in their existing condition. All other material shall be removed by this contractor.
- E. All circuits which are required to remain active shall be maintained or reworked as required.

END OF SECTION 260000

SECTION 260500 - BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 REFERENCE

- A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 specification sections apply to work of this section.
- B. Division 26, Section 260000, Electrical General Provisions, apply to work of this section.
- C. Section 263200, Standby Towable Electrical Generator System.

1.02 CONTENTS

- A. Specified Herein: Requirements for basic electrical materials, equipment and wiring methods.
- B. Described herein are the following:
 - Scope
 - Manual Transfer Switches
 - Fuses
 - Connectors, Lugs, Taps and Splices
 - Conductors
 - Conduit
 - Conduit Fittings

1.03 SCOPE

- A. The work under this section shall comprise, but is not necessarily limited to the following:
 - 1) Provide all labor and material required to install new service equipment, manual transfer switches, utilization outlets and fuses needed to allow the existing lift stations to operate on a portable generator.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Storage Conditions: It is recognized that space at the project for storage of materials and products may be limited. Coordinate the deliveries of electrical materials and products with the scheduling and sequencing of the work so that storage requirements at the project are minimized. In general, do not deliver individual items of electrical equipment to the project substantially ahead of the time of installation. Limit each shipment of bulk and multiple use materials to the quantities needed for installations within days of receipt.

- B. Handle all electrical material carefully to prevent damage, dents or marring of the finish.
- C. Protection and Identification: Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identification; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior storage.
- D. Do not install damaged material. Remove from the project site.

PART 2 - PRODUCTS

2.01 MANUAL TRANSFER SWITCHES

- A. Manual transfer switches shall be service entrance rated heavy duty, sheet steel enclosed, double throw fused safety switches, of the type, size and electrical characteristics indicated, surface mounted, fusible rated at 250 volts on the 240 volt system, ampere ratings as required for the application or as noted on the drawings, 60 Hertz, 6 blades, incorporating quick-make, quick-break type switches, equipped with operating handle which is easily recognizable, and is padlockable in "EITHER" position; with current carrying parts constructed of high-conductivity copper and silver-tungsten type switch contact; with positive pressure type reinforced fuse clips. All switches shall be of the same manufacturer. Handle shall be interlocked so switch cannot be opened in the "ON" position.
- B. Fuses: Provide fuses for switches, as recommended by the switch manufacturer of class, type and rating needed to meet electrical requirements.
- C. Switches installed in outdoor locations shall be weatherproof stainless steel NEMA 4X.
- D. Switches manufactured by the following will be acceptable:
 - PSI Control Solutions
 - Square "D"
 - Eaton
 - General Electric
 - Submit complete shop drawings.

2.02 FUSES - 600 VOLTS AND LESS

- A. Fuses shall not be installed until equipment is ready to be energized. All fuses shall be of the same manufacturer to assure selective coordination.

- B. The electrical contractor shall furnish and install a complete set of fuses for all fusible equipment on the job. Unless otherwise noted all fuses shall be U.L. listed, current-limiting and have an interrupting rating of 200,000 RMS amperes symmetrical.
- C. All fuses rated 600 amperes or less shall be time-delay current-limiting U.L. Class RK1, unless otherwise noted. They shall be:
 - Mersen Amptrap 2000; A2DR
 - (250V) Bussman Low Peak;
 - LPN-RK (250V) Littell Fuse;
 - LLNRK (250 V)
- D. All fusible equipment rated 600 volts or less and 600 amperes or less shall be equipped with factory installed Class "R" rejection clips unless otherwise noted.
- E. Spare fuses amounting to 20% (minimum three) of each type and rating shall be supplied by the electrical contractor. These shall be turned over to the Contracting Officer upon project completion.

2.03 CONNECTORS, LUGS, TAPS AND SPLICES

- A. Joints in #10 AWG and smaller wire shall be made with Minnesota Mining and Manufacturing Company insulated "Scotch Locks", Ideal Company "Wing Nut", or T & B Company "Piggy Connector".
- B. Joints in #8 AWG and larger shall be made with pressure type mechanical connectors and insulated with electrical tape or manufacturer's insulation kit to 200% of the insulating value of the conductor insulation.
- C. Straight taps to be ILSCO SPA Series or equal. Taps of multiple and parallel conductors are to be made with mechanical connectors listed for the quantity and size of conductors, ILSCO Type PTA or IPC or equal.
- D. Splices may be made with long barrel compression sleeve connectors insulated to 200% of cable rating. Compression connectors to be long barrel type, ILSCO Type CTL or equal.
- E. Lugs to be mechanical type connectors of size and ampacity to match service used. Provide compression lugs where required by equipment installed. Compression lugs to be long barrel, heavy duty type.
- F. All materials for copper wiring shall be copper.

2.04 CONDUCTORS

- A. All wire shall be in strict accordance with the applicable standards and shall be delivered on site with original factory tags attached and shall be less than one (1) year old when installed.

- B. Except as specifically designated otherwise, no wire smaller than No. 12 AWG copper shall be used. Generally, all wire and cable sizes are shown, either directly or by implication that no marking designates No. 12 size. In the event that size is not indicated for a feeder or motor run, which obviously could not be interpreted as No. 12, the wire size shall conform to the sizing for the rating of the service protective device.
- C. Single conductor 600 volt wire shall be copper and be equal to or better than THW, THWN/THHN or XHHW specifications. Wire shall be rated for 75 degrees C. maximum temperature in dry locations and 90 degrees C. in wet locations and below grade. Wire shall be listed by UL and conductor identification shall include size, voltage manufacturer's name and number, UL listing and wire type.
- D. Wire sizes up to No. 10 AWG shall be solid or stranded, No. 8 AWG and larger, stranded.
 - 1) Use stranded conductors for motors and other connections subjected to vibration.
 - 2) Color code wiring in accordance with N.E.C. standards. Match city standards.
- F. All ground conductors shall be green. All neutral conductors shall be white. Where neutrals of different voltage systems share the same conduit, they shall be of different colors (as allowed by the NEC) and labeled at all junction and outlet boxes.
- F. Wire shall be as manufactured by Southwire, General Cable, Pirelli, Essex, Continental or other approved manufacturer.

2.05 CONDUIT

- A. General: All wiring to be installed in metal conduit with fittings of type, grade, size and weight (wall thickness) indicated for each service. Where conduit type and grade are not indicated below, conduit shall be rigid galvanized steel and comply with National Electrical Code for electrical raceways. Minimum size conduit shall be 3/4" unless otherwise noted. All conduit shall bear the U.L. label. All threads shall be coated with an approved electrically conductive, corrosion, resistant compound.
- B. Underground Conduit: Schedule 40 direct burial Type PVC conforming to UL 651, NEMA TC2-1978 and Federal Specification WC-1094A. and shall include a green ground wire with the circuit conductors. Conduit to be Carlon Plus 40 or approved.
Location: Direct buried conduits.

2.06 CONDUIT FITTINGS

- A. Conduit fittings for exposed work shall be rust resistant. Castings shall provide ample wiring space, shall have smooth round edges and full-threaded hubs. All exposed threads shall be coated with an approved electrically conductive corrosion, resistant material.
- B. Fittings shall be as manufactured by Crouse Hinds Appleton, Killark, or approved manufacturer.
- C. All conduit fittings shall be U.L. listed for conduit material, in particular, for transition from one material to another.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Installer must examine the areas and conditions under which electrical work is to be installed and notify the contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.02 ELECTRICAL INSTALLATIONS

- A. General: Install electrical equipment for this project as indicated, in accordance with the manufacturer's written instructions, the applicable requirements of NEC and the National Electrical Contractors Association's "Standard of Installation", and in accordance with recognized industry practices to ensure that products serve the intended functions.

3.03 SAFETY SWITCHES

- A. Do not install switches on equipment to obstruct unit nameplates or access panels. Exact locations are to be coordinated in field.

3.04 CONDUCTORS AND CONDUIT

- A. General: Except as indicated hereinafter or on the drawings, all wiring shall be installed in conduit. Wiring for feeders buried in earth shall be insulated conductors in rigid Schedule 40 PVC, 24" below finished grade (minimum).
- B. Conduit Installation: Conduit sizes, type and length shall be furnished and installed as required by the drawings and as specified in these specifications. The drawings indicate generally the size and location of the conduits. Conduits not shown but obviously required shall be run where directed, of sizes as approved by

the Engineer. The conduit system shall connect all boxes, switches and control panels.

- C. Field bends and offsets shall be uniform and symmetrical, without conduit flattening or finish scarring. Minimum bend radii shall be as required by the NEC, but in no case less than six (6) times conduit diameter.
- D. Conduit found unacceptable while on the job before installation shall be removed from the premises upon notice.
- E. Approved pipe plugs or caps shall be installed in conduit before pouring of concrete. Conduit shall also be kept dry and free of water and debris by means of plugs or caps.
- F. Where conduit enters a panel or enclosure, the entrance shall be made watertight. Conduits shall be sealed to eliminate water infiltration. Contractor shall use Polywater FST or Raychem "RDSS" duct sealing system.
- G. At all entrances to enclosures, conduit runs shall be secured in place with galvanized lock nuts and bushings; one lock nut inside and one lock nut outside the box with the bushing on the inside. Bushings shall be of the insulating throat type. Where conduit fittings are used, a single locknut with insulated throat fitting is acceptable.
- H. Field bends shall be made with standard tools and equipment manufactured specifically for conduit bending. Use factory elbows for bends in conduit larger than 2" trade size. Use conduit bodies to make sharp changes in direction.
- I. Complete the installation of electrical raceways before starting installation of cables within raceways.
- J. All conduit shall be rigidly and independently supported from the structure. Provide all miscellaneous galvanized steel and support framing for electrical installation.
- K. All PVC conduits shall have bell ends. Provide expansion fittings at spacing recommended by the manufacturer.
- L. Conductor Installation: Conductor sizes, type and quantity shall be furnished and installed as required by the drawings and as specified in these specifications.
 - 1) All wiring shall be installed in accordance with the applicable provision of the National Electrical Code and as specified herein and shown on the drawings.
 - 2) Pull conductors together where more than one is being installed in a raceway.
 - 3) Use pulling compound or lubricant, when necessary; compound must not deteriorate conductor and insulation.
 - 4) Keep conductor splices to a minimum.

- 5) Wire shall be installed only after all work that may cause injury is completed, such as the pouring of concrete.
- 6) Install splices and taps which have equivalent or better mechanical strength and insulation as the conductor.
- 7) Use splice and tap connectors which are compatible with the conductor material.

END OF SECTION 260500